



THE MODEL ENGINEER

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The MODEL ENGINEER

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S M O K E R I N G S

Our Cover Picture

● THIS WEEK we break away from our usual style with a composite picture symbolising the variety and range of models which will be seen at our Exhibition now showing at the New Royal Horticultural Hall. All the photographs used are of models actually exhibited, except for the gentleman in the top left-hand corner, who is busy finishing his model.

Exhibition Memories

● I HAVE been smoking a thoughtful pipe over the early days of the MODEL ENGINEER Exhibition. I remember the doubts in my mind when I planned the first show, the main problems being should we be able to fill the hall? Would the models come along? Would the trade exhibitors rally round? and would the model engineers of the country make the journey to the Royal Horticultural Hall? These questions have all been answered through the years in a most convincing way, and so popular has the event become that it is now not a question of finding exhibits but of finding enough space for them, even in the larger hall into which we have moved. It is rather amusing to reflect that in order to obtain revenue to meet the heavy expenses we had in the early years to let space to firms offering furniture, spectacles, rubber stamps, and even on one occasion Japanese scent! Well, those were struggling days, but we had faith in the enter-

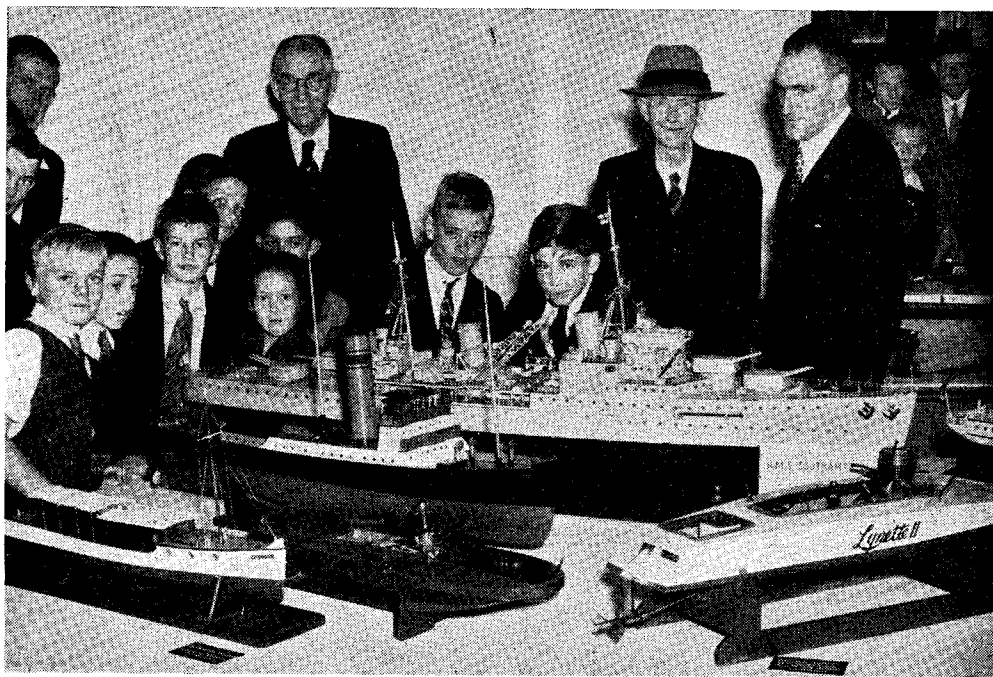
prise, and slowly but surely the annual show has built up into a truly "all model" affair, not forgetting, of course, the most important exhibits of tools and workshop equipment. I remember the days when the working-railway consisted only of a rather fragile elevated track on which a miniature train performed its evolutions to the admiration of a juvenile crowd. The thought of putting down a real live-steam track indoors was a somewhat perturbing one—what about the cost, the smoke and sparks, the risk of accident, and the railing-off of the crowd? The plunge was taken, however; first of all a short enclosed track was installed, then a longer one a year later, and finally space was found for the elevated track of the S.M. and E.E. which was such a prominent feature of the show for many years. Nowadays the passenger track is a common enough feature of every local club exhibition and gala day, but its popularity is unabated. Although the awarding of medals and diplomas was a feature of the Competition Section from the very beginning, the quality of the entries improved so rapidly that it was felt desirable to offer a special trophy for the best exhibit. So the idea of a Championship Cup was adopted, and Mr. E. W. Fraser had the distinction of being the first to receive this honour for his beautiful miniature of a Vauxhall car chassis. For the next few years the competition for this Cup was very keen, but a problem arose through the great difficulty of comparing the relative merits of very different types of

models; for example, a locomotive, a steam or sailing ship, a clock, or a stationary engine. This was solved by awarding four separate Championship Cups in the respective classes of locomotives, general models, and steam and sail. This eased the work of the judges very much and gave every satisfaction to the competitors. These trophies have been won by models from all parts of the country, and, needless to say, are very greatly valued. Before the days of broadcasting, wireless exhibits of an experimental nature were a

occasions, and gave their blessings to the work of model engineers. The show goes on, better every year in every way, a constant tribute to the skill and ingenuity of the model engineers, and to their great capacity for mutual goodwill and friendliness. Long may it be so.

Delightful Durban

● DURBAN, THAT cheerful centre of South African social life, has lately turned its attention to a revival of model engineering. In the City



The Ship Model Corner at the Durban Society's Exhibition

frequent feature of the show, and on one occasion great excitement was aroused by the receipt in the Hall of a message in Morse transmitted from a ship in the middle of the Atlantic. The transmission of actual speech by radio was then only a vague anticipation of the future. The trade stands have always been a prominent and much appreciated section of the Exhibition, providing, as they do, an exceptional opportunity of personal contact between traders and their customers. A particular compliment must be extended to Messrs. Buck & Ryan, who have been represented by a fine display of tools at every show we have held, except in the first year. I do not know their later records, but they told me that on one occasion they served no less than 2,000 customers. A smile comes to my face as I remember the formalities of exhibitions in those early days, when the officials and the salesmen were expected to appear in top hats and frock coats! We were all so very dignified. Some rather elaborate opening ceremonies marked the pre-war years. Sir Hiram Maxim, Lord Stamp and Mr. Leslie Hore Belisha were among those who figured on these

Hall, in May last, the Durban Society of Model Engineers made its first post-war public appearance with a fine show of its members' work. The photograph herewith indicates some of the ship modelling talent in the Society's ranks, and in another picture on my desk I see engineering models of every kind. So much interest was aroused by this show that the Society has been asked to put on a display, on a larger scale, at the South African Industries Fair, due to be held this September. The ordinary meetings of the Society are held every Friday night in a clubroom at the Technical College Club House, and there is no lack of interesting talks and discussions on all phases of model engineering work, including the up-to-date subject of miniature racing cars.

Personal Hamsey

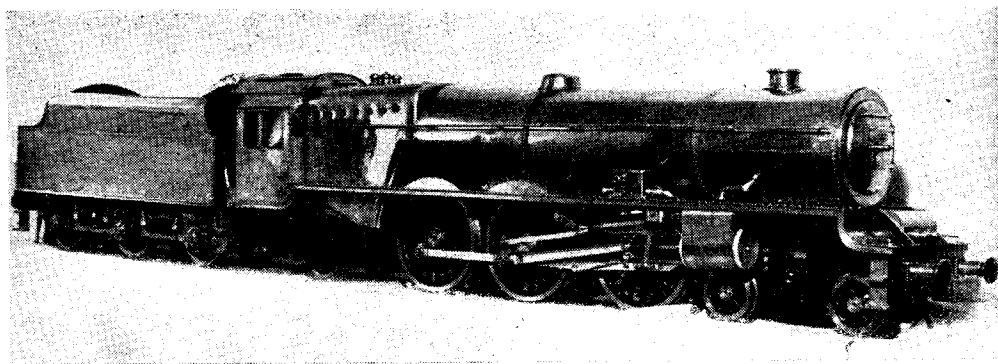
"PRINCESS ROYAL"

ENTERED FOR THE CLUB CUP AT THE "M.E." EXHIBITION

built by N. E. Nicholson and described by W. J. Hughes

ALL members of the Sheffield S.M.E.E. would agree that Norman Nicholson is one of the Society's mainstays. A founder-member, he became Secretary shortly after the club's inception, and held the position for eight years, resigning only under the pressure of other work, but retaining the post of Treasurer. I do not

And then, after several hours' running, she walked away comfortably with thirteen men, mostly of large-ish size, which was all we could crowd on to the two trucks available—and this was on a by no means perfect track, by the way, and with the boiler not at full working pressure. She just snorted and dug in her heels; then "Wup!"



The excellent appearance of the "Princess Royal" is demonstrated in this view, though the lighting unfortunately gives a "wavy" appearance to the firebox lagging

know whether he has been present at every club-meeting, but I cannot recall attending one myself when he was not there. His genial, quiet personality coupled with his capacity for organisation and hard work have made him very popular among his fellow-members, and his clever craftsmanship has called forth their admiration.

Everyone was pleased, therefore, when Norman won the premier awards at our 1946 Exhibition with his $\frac{3}{4}$ in. scale "Princess Royal." We had seen "bits and pieces" grow into a chassis, and now the chassis had evolved into the loco.—and a loco. to be proud of. Sleek and gleaming in her polished brass finish, yet with every inch of her denoting power and purpose, she was certainly "champion." And so thought the judges, for she won the Open Championship Cup, the President's Cup, and First Prize in the Loco. Section—a worthy and well-deserved culmination to several years' hard work.

"Princess Royal"

During the Exhibition, I had the privilege of driving the "Princess" on the track, and the power and the purpose were there right enough! The boiler supplied ample steam for the four cylinders, which made child's-play of the passenger work. The even exhaust beat and the low steam consumption denoted perfect valve-setting, on this, her first trial on the track.

—"Wup!"—"Wup!"—and away she went, with no fuss or bother.

The Workshop

The place of her creation is a medium-sized basement room, which was strengthened for use as a shelter during air-raids, so that steel props were liable to catch the unwary "funny-bone," and bunks, folding-chairs, and other impedimenta made things a little crowded, to say the least. Of course, the said impedimenta were removed at the earliest opportunity; but, for many moons they did *not* contribute to the joys of model engineering.

The chief machine-tool was a 4-in. Drummond round-bed lathe, fitted with Walram back-gear, and all the turning was done on this. Later on, a No. 2 Adept hand-shaper appeared, which, says Mr. Nicholson, has proved itself a very useful and valuable addition to the workshop. All drilling on the chassis and motion-work was done with an auto-feed hand drill—the well-known "drill-killer" type, but in 1943, a four-speed "Tauto" 0- $\frac{1}{2}$ in. sensitive drill-press was installed and proved itself a considerable improvement which was very welcome when it came to the upper works of the engine.

The latest workshop addition, however, would bring a gladden to the eye of any model engineer; it is a 6-in. Colchester lathe, with self-contained vee-rope drive, lever-operated clutch, all-gear

headstock, and, in the words of the house adverts., "every mod. con." I hasten to add that this machine is installed partly for business reasons as well as for pleasure. Its owner is a director of a haulage company, and can effect quick repairs to his "wagons" which otherwise might keep one off the road for weeks. Other workshop equipment serving a similar dual purpose is a small B.O.C. welding plant.

The Engine

The locomotive is a $\frac{3}{4}$ in. scale model of the famous L.M.S. Pacific, and is a very faithful reproduction—in fact, in addition to the awards mentioned above, she won the Salem Cup at the 1947 Leeds Exhibition of the West Riding Small Locomotive Society, for the "model locomotive most true to prototype."

The overall length of loco. and tender is 4 ft. 10 in., and the boiler is $24\frac{1}{2}$ in. long from smoke-box tube-plate to backhead. The fire-grate is 6 in. long, and tapers in breadth from $5\frac{3}{4}$ in. at front to $4\frac{1}{2}$ in. at back. A combustion chamber with 8 water-tubes is fitted, and there are 21 flue-tubes $\frac{3}{8}$ in. diam., and two superheater flues $\frac{3}{4}$ in. diam. Twin superheater elements with "block" return project into the combustion chamber.

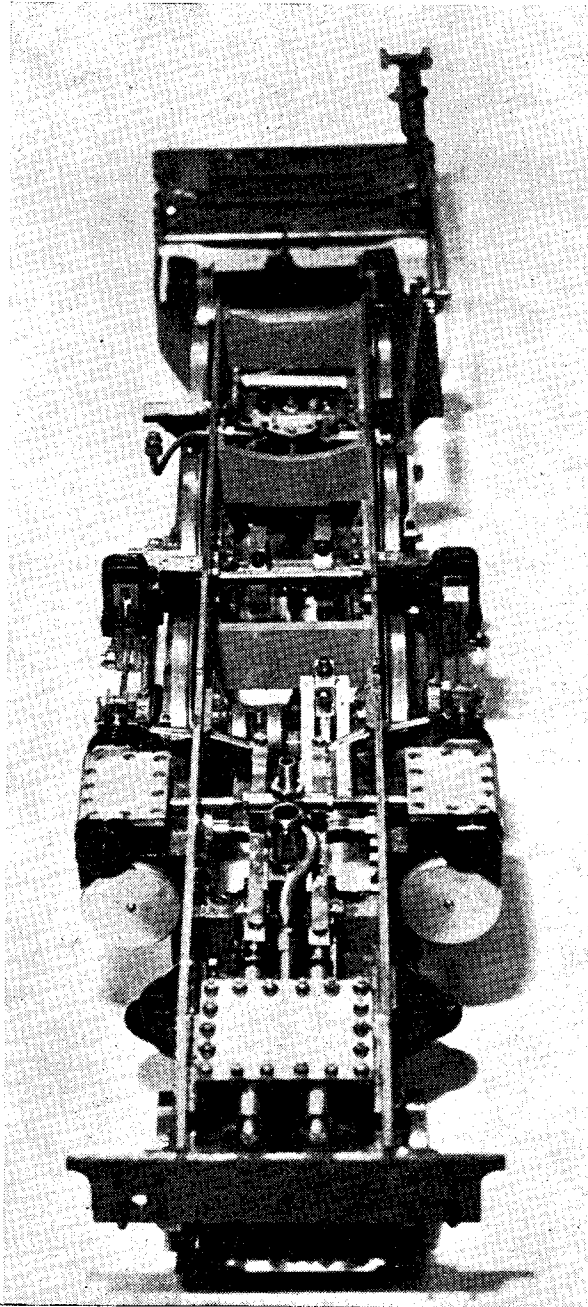
The boiler barrel, of true L.M.S. shape, was rolled from sheet, with a strip riveted and brazed over the butt-joint. Almost all

the soldering on the boiler was done with "Easyflo," using the small welding-plant, and when finished, it was lagged with asbestos board, and again with 26-g. sheet brass, held by the usual clips. It was tested to 200 lb. pressure.

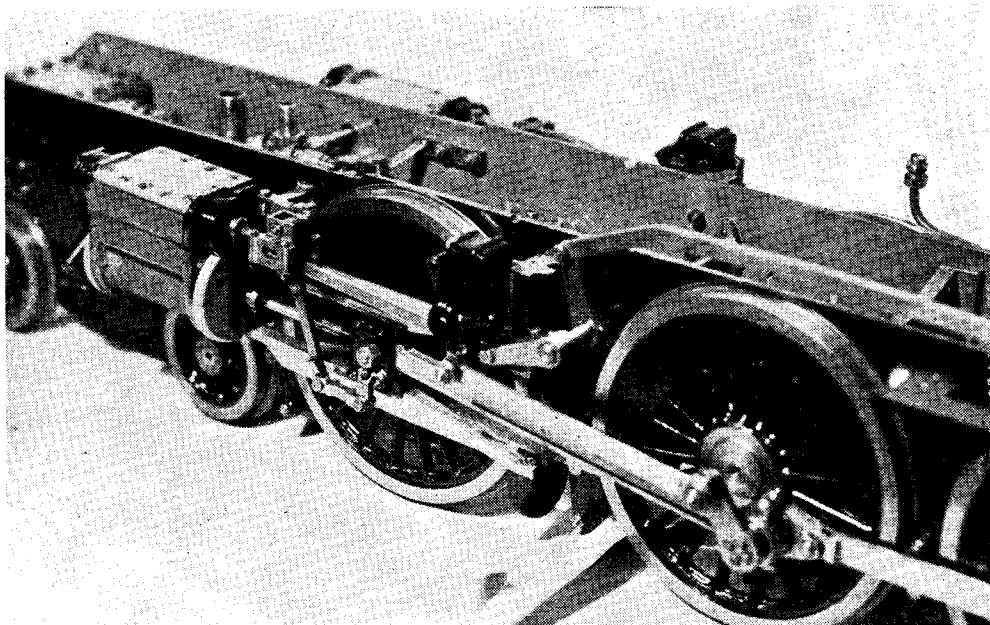
Four "pop" safety-valves are set to blow off at 120 lb. per sq. in., which is the designed W.P. of the boiler. Twin water-pumps are driven from the rear coupled-axle, and, in addition, an "L.B.S.C." injector, with No. 74 delivery-cone, really does deliver the goods, in no uncertain manner, the emergency pump in the tender being almost superfluous.

Cylinders

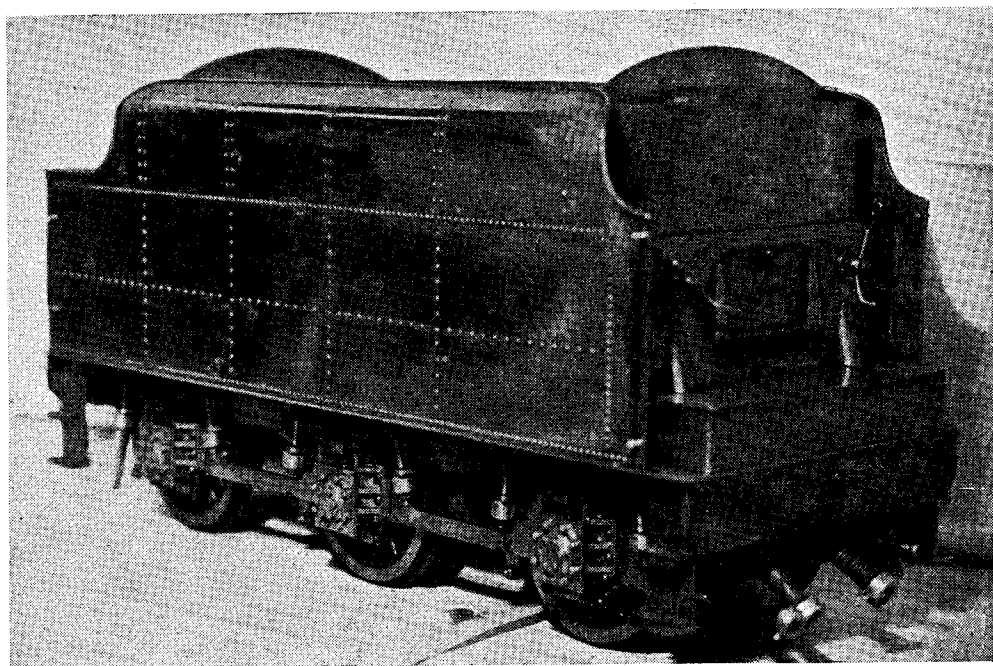
There are four cylinders of 1 in. bore by $1\frac{1}{4}$ in. stroke, and the inside valves are driven by rocking-levers from the outside valve-gear, all being slide-valves. As previously mentioned, steam-distribution is excellent, with a correspondingly low fuel consumption, and the builder attributes this to the fact that he was extremely painstaking and careful in making the valve-gear. For example, a jig was made, of the hole-and-peg type (see sketch) for use in drilling the rocking-levers. The fulcrum-hole of the rocker was drilled first, the peg slipped into it (a good fit, of course), and the hole for the outside pivot-pin drilled through that in the jig. The latter was then turned through 180



The chassis. Note the rocker-drive from outside to inside valves, the crank-axle, and the twin eccentrics for pump-drive



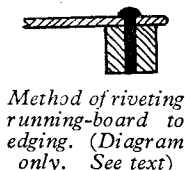
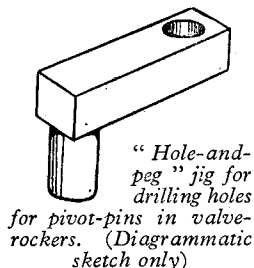
The motion, with its Walschaerts valve-gear. Note how the intricately-shaped valve cross-head drives the valve-rocker through a short link



The tender. Note the close-riveting, the brake-handles, and the detail of the axleboxes

degrees, and the hole for the inside pivot-pin drilled through it, thus ensuring that both pivot-pins were exactly equidistant from the fulcrum, and giving exactly equal valve-travel. Jigs were also used extensively in other valve-motion parts.

Valve-ports were cut with a special "gang-type" milling-cutter as described so often by "L.B.S.C.," and here again great care was taken to ensure exact dimensions everywhere. Slide-bars were built-up and brazed from steel, as was the crank-shaft. Cylinders are lubricated by a mechanical lubricator on each running-board, driven from the crossheads.



The main axle-boxes are of the two-piece type, with keep. The axle-holes in the coupled wheels were bored out to fit the axles; for boring the holes for crank-pins, a jig was made similar to that described by Mr Westbury for "1831." It may be remembered that, essentially, this consists of a pin, turned to fit the axle-hole and mounted eccentrically on the face-plate. The wheel is fitted on this pin, clamped down to face-plate, and the crank-pin hole is first drilled under-size, and then bored out to size. The coupled wheels are $4\frac{1}{2}$ in. diam.

As will have been realised, Mr Nicholson is a great believer in scale realism, as far as is possible in a *working loco.*, and the engine's backhead bears out this principle—a photograph was published on the cover of the MODEL ENGINEER for October 31st, 1946, which is well worth looking up. It was closely copied from a drawing of the prototype, and carries the following fittings: double sliding fire-doors, controlled by single lever, two water-gauges, regulator, steam manifold with main stop-valve, steam-brake valve, blower-valve, pressure-gauge, whistle-valve, injector steam-valve, injector water-valve, and blow-down cock. And they're all get-at-able! Reversing is by screw at left-hand side of cab, and a special socketed extension handle is used when driving (see sketch). It is surprising how quickly one can go from full ahead to full reverse gear, and vice versa, with this little gadget—extremely useful when driving up and down our 60 ft. exhibition track.

One snifting valve serves all four cylinders, and is disguised as the vacuum-brake ejector. This is on the firebox side just in front of the cab, from where a pipe runs along the boiler side to the smokebox, and thence to the top header of the superheater.

Working steam-brakes are fitted to the loco., and hand-brakes to the tender.

Much realism is added to the appearance of both loco, and tender by the use of some 2,000

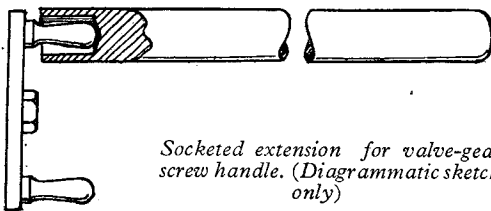
small rivets, of which about 1,200 are in the side sheets of the tender alone. Around the front end of the smokebox is a single row of 78 rivets, with a double staggered row at its rear end. Running-boards are riveted to the $\frac{1}{4}$ -in. square edging at $11/32$ in. spacing, and the cab-sides have their quota, too. The rivets were made quite simply. Mr. Nicholson says that one can do them very quickly, with practice; but then, he's had plenty of practice in putting 2,000 in.

However that may be, the method is this. A No. 54 hole was drilled, and a stub of 18-g. brass wire snapped off and pressed in. Holding the outside end, the inner end was filed off flush. This was now supported inside, and the outside end filed, allowing it to stand "proud" enough to enable a head to be formed. Still supporting the inside, the outside head was formed, using a specially-made snap. Note that no attempt was made to form a head on the inside—the body of the rivet is so expanded by the forming of the outside head that it cannot possibly come out of the hole—in fact, it is so tight that it would have to be punched or drilled out.

Running-boards, cab, and tender body are of 18-g. brass sheet. The tender chassis is of steel, with working brakes operated by two brake-handles on the front of the coal-plate, which rotate the vertical columns through bevel-gears, as in the prototype. The usual type of emergency hand-pump, as per "L.B.S.C.," is fitted in the water-space.

At the time of writing, the loco. is stripped down for painting in correct L.M.S. colours. The polished brass finish will disappear under the crimson lake (how better could it be hidden?) and the engine will look more like "big sister" than ever.

All castings and drawings were obtained from H. P. Jackson of York, and Mr. Nicholson has nothing but praise for them. Drawings were workmanlike and accurate, and no deviations or modifications were necessary. The castings were



smooth and clean, detail was very good, and there was ample machining allowance. What more could anyone want?

Most of the other materials required had been obtained in 1938-9, so that wartime shortages did not affect the working schedule greatly. It is typical of the builder, however, that having no $5/32$ in. diam. copper tube and not being able to obtain any, he built special apparatus to draw some down from $3/16$ in. diam. A few other shortages were overcome by co-operation from fellow club-members—one of the advantages not shared by a "lone-hand."

(Continued on page 204)

A CRANKSHAFT TURNING FIXTURE

by M.A.C.

MUCH has been written at various times concerning methods of producing the overhung crankshafts usually associated with miniature I.C. engines, and although with care efficient shafts can be fabricated, their strength and parallelism are always open to conjecture, and it is therefore generally conceded that crankshafts machined from the solid are to be preferred.

The usual methods of turning, either between offset centres or on a vee-block attached to the

measures serving to prevent damage to the shank end when the fixture is knocked out of the lathe spindle from the rear end.

The drawbolt, Fig. 2, is a length of silver-steel screwed $\frac{1}{4}$ in. B.S.F. at each end and provided with a nut, Fig. 3, knurled and tapped $\frac{1}{4}$ in. B.S.F. to suit the drawbolt. This nut may appear unduly large, but the smaller diameter was made to register in a short counter-bore already existing in the rear end of the spindle and so

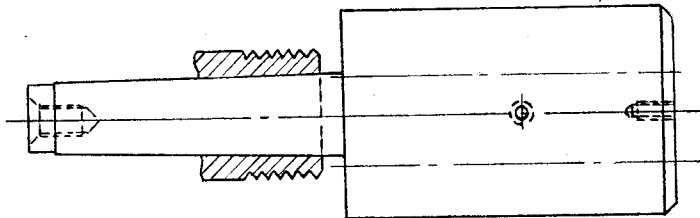
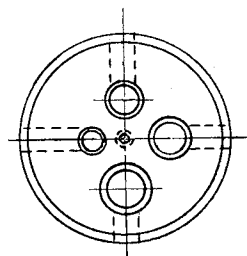


Fig. 1.

lathe face-plate, have many disadvantages, and it was to circumvent these that this fixture was made. It should be added, however, that, although the method is novel so far as the writer is aware, it would appear such an obvious solution to the crankshaft turning problem that he hesitates to claim it as original.

The dimensions given in the following notes refer only to the fixture under review and need not be adhered to, as these sizes will, of course, be modified to suit particular requirements.

To commence operations, a piece of mild-steel $1\frac{1}{2}$ in. diameter and $5\frac{1}{2}$ in. long was held in the

runs quite truly when tightened in position.

The fixture was then secured in the lathe spindle, Fig. 1, faced up, leaving a fine pip at the centre, and turned to $1\frac{1}{8}$ in. diameter. This diameter is not critical, but it should be made perfectly parallel. Using the pip to obtain centre height two fine lines at right-angles were scratched right across the face and before removing a 6-B.A. hole about $\frac{1}{4}$ in. deep was tapped.

The turning now completed, the job, clamped to a vee-block, was set on the marking-off table (alias the familiar piece of plate glass) and four

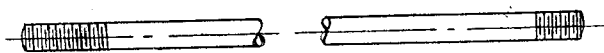


Fig. 2.

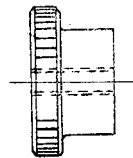


Fig. 3.



Fig. 4.

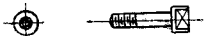


Fig. 5.

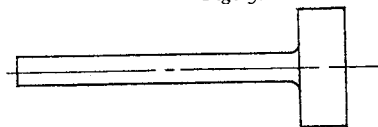


Fig. 6.

three-jaw chuck, faced off and centred, and whilst supported by the tailstock centre the No. 2 Morse shank, to suit the spindle of the lathe, was turned. To avoid the chucking and re-chucking which would have been necessary had the taper been fitted directly to the spindle, a new 2-3 Morse taper socket was borrowed and the shank turned to fit this. At the same setting a $\frac{1}{4}$ -in. B.S.F. hole was tapped, the hole counter-bored and the end of the shank relieved as shown, these

lines intersecting those already mentioned were scribed at $\frac{1}{4}$ in., $\frac{1}{8}$ in., $\frac{3}{8}$ in. and $\frac{7}{8}$ in. radii and the points of intersection very lightly dotted. The fixture, still secured to the vee-block, was next mounted on the saddle and carefully lined up to the axis of the lathe by means of a home-made indicator held in the chuck and the parallel diameter previously turned. The centre of the first hole to be bored was located by means of a time-honoured dodge, much used by millers and

horizontal borers, which is mentioned here for the benefit of readers who do not know it.

A centre drill is held in the chuck and a blob of plasticine or some similar substance stuck on the end. A pin or gramophone needle is set in this and, with the lathe revolving, the point is set to run true, this point then representing the centre of the lathe spindle. The pin point and the dot on the job are made to coincide (which can be ascertained by using a glass), the job tightened in position and boring may proceed. The first hole on the $\frac{1}{4}$ -in. radius was bored and reamed $7/32$ in. diameter, the holes running the full depth of the fixture body. The opposite hole, on $\frac{3}{8}$ -in. radius, the location of which was found by the cross-slide index was reamed $9/32$ in. and, repeating the process, the holes on $\frac{5}{16}$ -in. and $\frac{7}{16}$ -in. radii were reamed $\frac{1}{4}$ in. and $\frac{5}{16}$ in. respectively.

All four holes were finally provided with a liberal chamfer to clear the radius which should be present at the junction of journal and web of any self-respecting crankshaft.

The next step was to drill and tap four holes for the 2-B.A. Allen grub-screws which serve to lock the component in the fixture. Referring to Fig. 4, it will be seen that these were modified by drilling the ends and inserting small copper pads. This was done to prevent damage to the crankshaft journal whilst held in the fixture.

The last component is the silver-steel pin, Fig. 5, the end of which is screwed 6 B.A. to suit the hole in the fixture, whilst the head is flattened as shown and drilled with a small centre drill.

Having now particularly described and ascertained the nature of our fixture (if one may be permitted an excursion into Patent Office jargon), the machining of a crankshaft can now be considered, and one having a journal diameter of $\frac{1}{4}$ in. and $\frac{5}{16}$ in. throw, i.e. for an engine of $\frac{1}{2}$ -in. stroke, will serve as an example.

The journal is turned in the normal way by chucking one end and centring the other, the crank-disc diameter being turned at the same setting. The whole is then parted off from the bar, which produces a component similar to Fig. 6.

Having inserted the journal in the appropriate hole in the fixture the crankshaft is locked by means of the grub-screw, Fig. 4, and machining of the crankpin is commenced by drilling a 6-B.A. clearance hole and inserting the pin, Fig. 5. The component is then positively located and using the back centre as a steady, the crankpin turning becomes a straightforward job.

No out of balance will be noticed at normal turning speeds, but at higher polishing speeds any tendency to vibration can be damped out by using a plug of material in the opposite hole.

It should be mentioned that one is not confined to any particular combination of journal diameter and crankshaft throw as provided by the fixture. If the longitudinal holes are reamed to the largest size ever likely to be required for any specific engine stroke, the journal can be semi-finish turned between centres to suit the fixture bore and finished to the required diameter after completing the crankpin.

"Princess Royal"

(Continued from page 202)

There were no undue snags in building, but occasionally things went wrong, and the loco. nearly went out of the window, accompanied by Railroad Esperanto! Which of us does not know these trying moments? But in usual model engineers' style, the difficulties were overcome, of course.

When I asked Norman how long he had been model-building, he replied: "As long as I can remember." His first urge to build a loco. was in 1919, when, a schoolboy, he bought a copy of *Models, Railways and Locomotives*, a periodical now defunct. He "played about" for a time, as many of us did in our youth, making the models which, because of lack of tools and experience, and perhaps because of an excess of youthful over-optimism, didn't work out as they should have done.

Then, in 1926, he started taking the MODEL ENGINEER, and set to work in 1927 to build "Helen Long." There were very long periods when the workshop and "Helen" had to be neglected, but she was eventually completed early in 1938. She too is a lovely loco. and has won various "firsts."

The building of the "Princess" was begun in 1938, but she was packed away on the outbreak of war, until 1942, when the grease was cleaned off and a fresh start made. It will be seen, therefore, that the spare time of five to six years was spent in building her.

As a matter of encouragement to the "tyro,"

by the way, it may be said that the only mechanical or engineering training which Mr. Nicholson has had *has been acquired in his own workshop by his own efforts.* Back in 1927 when "Helen" was begun, he had had no engineering experience whatsoever. But a special tribute is deserved by "L.B.S.C.," he says; the latter's machining methods and other valuable hints and tips have been of great benefit.

And now what of the future? Reposing in a box under a bench are a set of castings for the L.N.E.R. "Green Arrow," to $\frac{3}{4}$ in. scale, also from the establishment of H. P. Jackson. By the time this article appears in print, it is likely that a good start will have been made on this loco. Running simultaneously with "Green Arrow" will probably be an inch-scale version of the M.R. 0-6-0 goods engine designed by Matthew Kirtley; this will be scaled down from L.M.S.R. drawings.

It would be idle to speculate how long these locos. will take to mature, but I have no doubt that when either appears in the loco. section of some future Sheffield Exhibition, any competitor will have to be exceptionally good to take away the Cups.

In the meantime, I for one am looking forward to the completion of our 380-ft. continuous track; I want to see the "Princess" in unrestricted action. And I certainly look forward with the keenest pleasure to the privilege of taking over the regulator when that day comes.

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A PRIZE-WINNING CONGREVE CLOCK

by A. H. Nettleton

HAVING received the silver medal awarded for the Congreve clock exhibited at THE MODEL ENGINEER Exhibition, 1946—for which I am justly proud—I thought perhaps a short resume of my endeavours as an amateur in horology would not come amiss.

The original Congreve clock was invented by Sir William Congreve, and patented in 1808,

when the clock-making industry was striving for perfect time-keeping. The Congreve, although very attractive in appearance, and fascinating to watch (making a special appeal to the mechanically-minded) is not considered a good time-keeper; hence, only eight were made originally, although there are in existence various forms and divergent designs which have developed since.

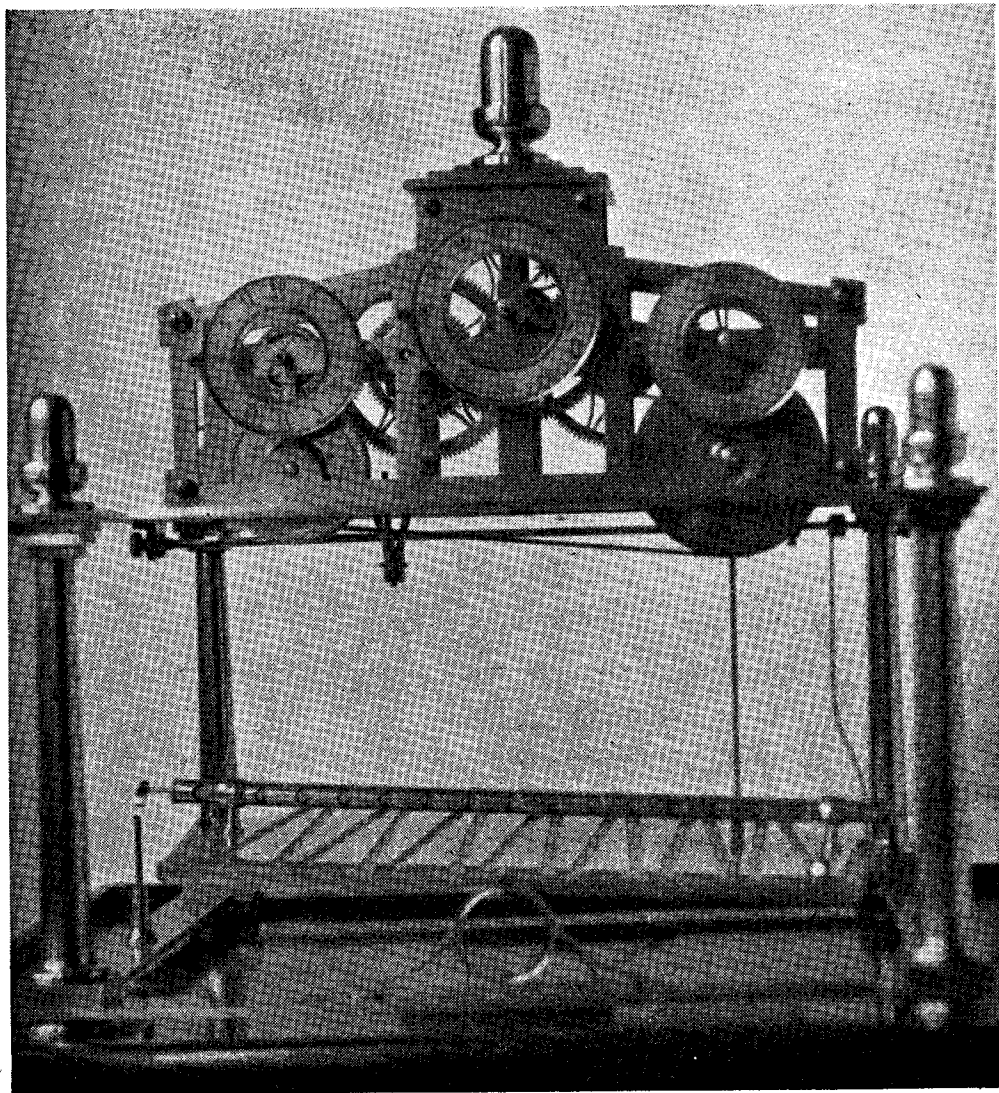


Photo by]

[L. Dupont

Front view of Mr. Nettleton's Congreve clock

There is nothing magical about the movement, it being purely mechanical, the table and ball acting as the escapement (of half-minute duration in this instance). A strong spring with suitable reduction gearing, drives a table, balanced on knife-edged bearings *via* an adjustable connecting-rod.

The table, which is grooved, allows a small ball to travel over its surface, tripping the movement at the end of its run, which in turn, tilts the table, starting the ball on its journey back.

Having finished an electric master clock, which proved highly successful I thought I would try something a little more ambitious, so casting round for a prototype, saw one of the original Congreve clocks in a London shop window. No drawings were available, so I studied the movement for about half an hour, noting its main points and approximate sizes; then I made drawings, working out the gear ratios, which, when one gets down to them, are not very complicated. As previously mentioned, no drawings were available, so I decided my "datum line" should be the actual movement, leaving the framework, tilting table, etc., to be built to "scale" afterwards.

A start was made on the gears and pinions, the former cut from brass blanks, and the latter from silver-steel. They were all cut with the aid of a home-made dividing-head, a small replica of the usual machine shop pattern, mounted on a vertical slide, with cutter held on a mandrel in three-jaw chuck.

After the teeth were cut, the gears were mounted in a wood-chuck, recessed, bored and counterbored to fit on their respective arbors.

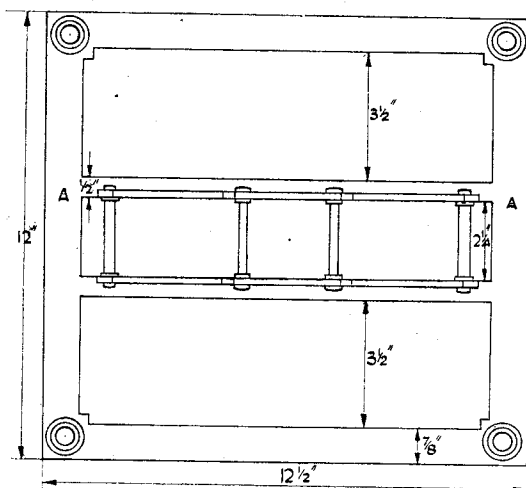
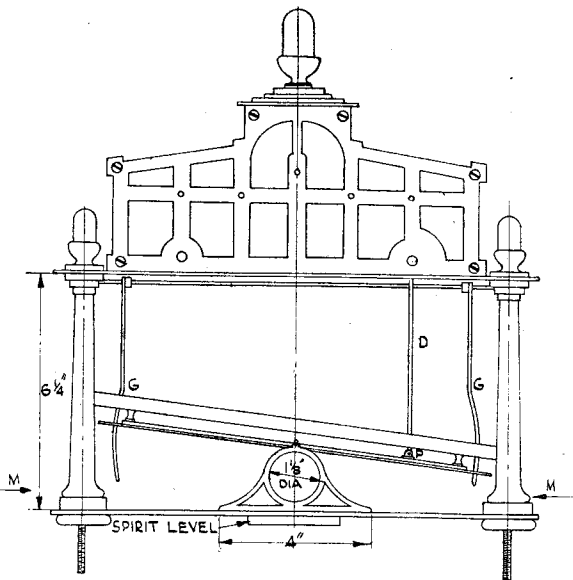
The next job was to fret them out, which required a lot of patience, as it was realised they should be as light as possible, consistent with strength, and, of course, they must run true.

After some very careful work with jewellers' saw and Swiss files at the vice, all the gears, with the pinions hardened and tempered, were mounted in a wooden frame and were found to run exceptionally well.

The barrel, arbor and fuzee were next taken in hand. A piece of $2\frac{1}{2}$ -in. o.d. brass tube was procured, machined square and recessed each end to take two flanges, one sweated in and the other a "spring in" fit. The arbor was machined from mild-steel rod, the centre left $\frac{3}{32}$ in. oversize and the hook for the main-spring filed to shape afterwards.

The fuzee presented rather a problem at first, as I did not possess a fuzee cutter, so I decided to cut it in the lathe. The method employed was not unique; I first cut and filed a template out of $\frac{1}{8}$ -in. mild-steel plate, the contour mostly guess-work. (I might add here that this was the first of three fuzees I cut for this clock; the first two were not in my opinion successful.) The template, screwed to a block of wood, was mounted on the bench just behind, and a little higher, than the shears of my lathe, a guide-piece, rounded on one corner

was then bolted to the cross-slide, to engage with contour of template, top slide was turned round 90 deg. and the feed-screw of cross-slide removed. Now, if one uses the main traverse, it is fairly obvious that the tool must follow any pre-determined contour, provided the guide-piece is kept in close contact with template, which, in my case, was the pressure of my left hand *via*



DIMENSIONS OF BOTTOM
FRAME SAME AS TOP, LESS
CROSS MEMBERS

"Skeleton" front view and plan of clock

my thumb. The top slide being turned 90 deg. to the axis of the lathe, enables one to put on the desired cut, it being clearly understood that the normal feeding in of the tool by the cross-slide has now been lost.

Rough-machined, the blank fuzee pressed and keyed on to its arbor was mounted in chuck and supported by the back centre. The cutting tool

are definitely not my strong point, and mathematically inclined readers will probably know a much better way.

After reviewing this article so far, I find I have spent more time than I intended on the production of the fuzee, but as the procedure is unorthodox, it will, perhaps, prove interesting.

With the return of the barrel from the spring

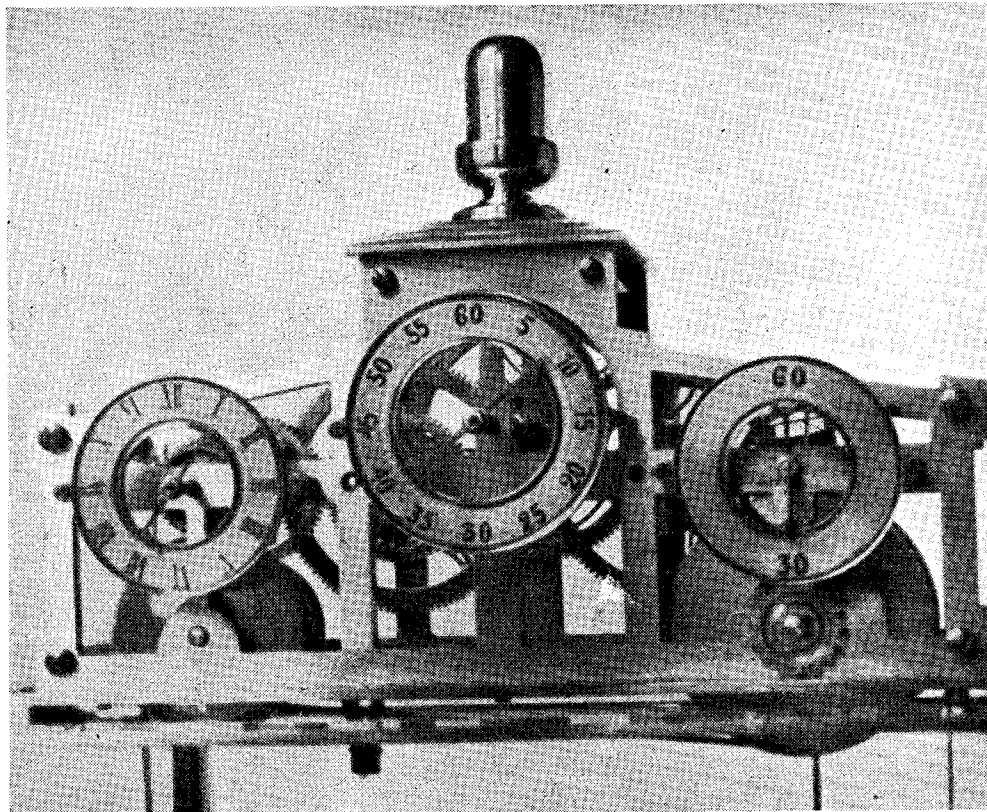


Photo by]

Close-up of movement

[L. Dupont

must be ground to the form required for the grooves, because both machining and screw-cutting must be done in one setting, any changing of tools during this operation would prove fatal, for if the second tool was not put in exactly the same position as the first, it would not follow the previous contour.

The formula I evolved for finding the number of threads per inch on the fuzee (the threads in this case being the grooves) =

$$\frac{A \times X}{C.B.}$$

Where A = average circumference of grooves

X = number of grooves per inch to be cut.

C.B. = circumference of barrel.

The result must be in the region of 5 (the maximum numbers of turns of the barrel) so it is a case of trial and error with X.

I must apologise for the above; mathematics

makers, by whom it had been fitted with a suitable spring, the gears, pinions, fuzee and barrel were assembled between a front and back plate, cut and fretted from $\frac{3}{16}$ -in. brass plate; the gears were successfully meshed by the use of a home-made depthing tool.

So far everything was O.K., so I turned my attention to the main framework, which was for the most part, hard graft with saw and file. Top and bottom frames were cut from $\frac{1}{8}$ -in. brass plate; also, a wooden pattern was made for the four corner pillars which I decided would be easier to machine from castings.

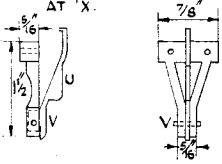
With the frame and movement assembled, things began to take shape, and the fruits of my labour were beginning to ripen; apart from the "blobs and gadgets," the only important part to make now, was the tilting table. It is composed of eighteen separate pieces; the base, which is cut from a very flat piece of $\frac{1}{16}$ -in. sheet brass,

approximately $9\frac{1}{2}$ in. \times $10\frac{1}{2}$ in., with fifteen suitably-cut pieces of sheet brass in the shape of triangles 1 in. \times 10 in. screwed to the base with 10-B.A. countersunk screws.

The other pieces are two lengths, screwed along each side, they are suitably cut with fifteen semi-circular guides; their function is to steer the ball round the corners at the end of each slot.

as an afterthought, the bar across the centre of the table was added; its function denotes the seconds as the ball passes underneath. It is composed of two tubes, one inside the other, the inner one is turned 90 deg. at each tilt of the table, showing the appropriate numbers through "windows" cut in the outer tube.

STOP-WORK, TO ARREST OVERWINDING, LINE-ON LAST TURN OF FUZZE CONTACTS LEVER 'U' WHICH IS HINGED AT 'V', MEETING SNAIL ON FUZZE, PREVENTING FURTHER WINDING. FITTED ON BOTTOM OF REAR MAIN PLATE AT 'X'.

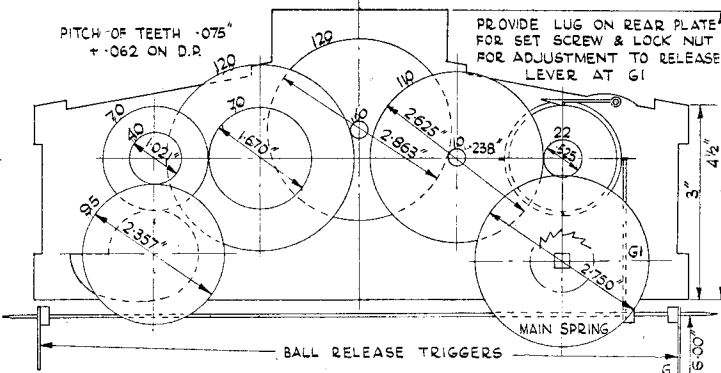
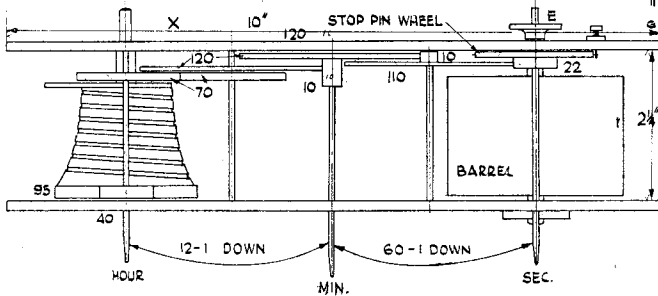


THE PIN 'H' IS CONTROLLED BY PAWL 'I' FOR LOCKING TABLE DURING RETURN RUN

DETAILS OF STOP PIN ESCAPE WHEEL THE PIN 'F' ON BEING RELEASED BY BALL AT EXTREMITY OF TRIGGER 'C' ALLOWS SECONDS ARBOR TO TURN 180°

THESE BRACKETS FITTED AT UNDERSIDE OF TOP FRAME AT 'A' (TWO OFF)

THE SHADED PART IS A SLIDING MEMBER CONTROLLED BY SCREW 'B' HELD BY FLAT SPRING 'C' FOR ADJUSTMENT TO INCLINED TABLE VIA CONN. ROD 'D'. THIS UNIT FITS ON SEC. ARBOR BEHIND REAR MAIN PLATE AT 'E'



Details of movement and unlocking mechanism

However, before the table was completed, it had to be packed away for five years, owing to the war, as I was transported from London to the country, as a machine-shop setter "for the duration."

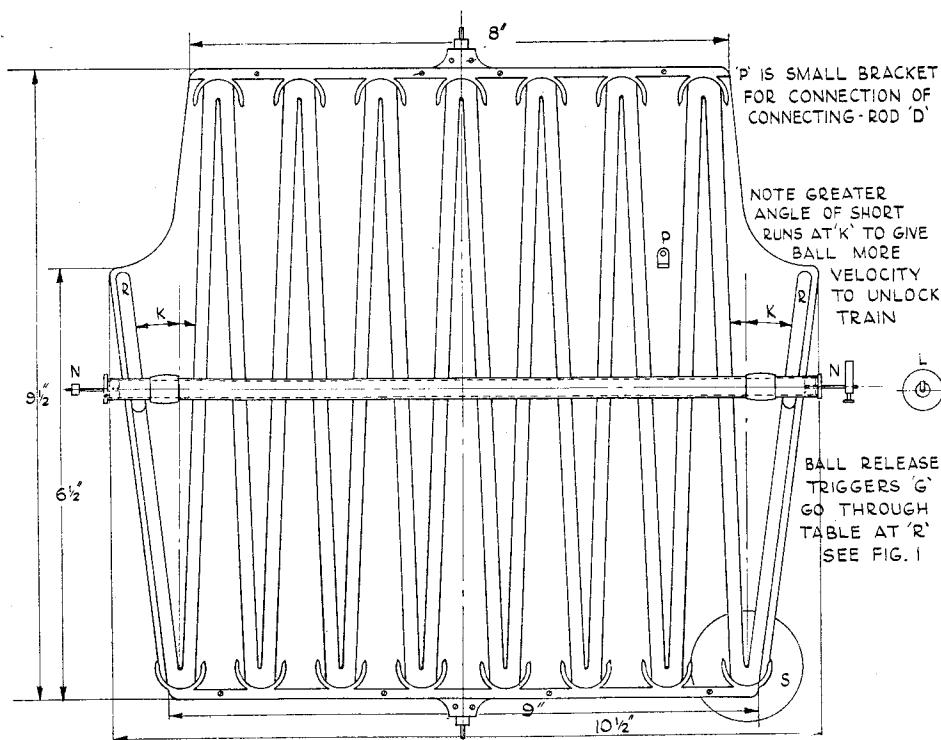
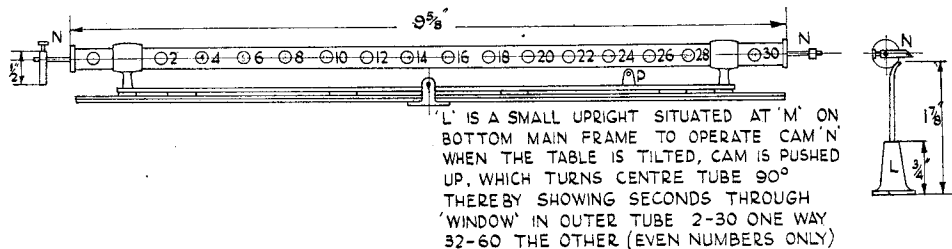
On my return, the table was completed, and,

The tripping arrangement, dials, and hands, were then made, and the whole clock assembled on an oak base and found fairly satisfactory.

Two more fuzees had to be cut, and every individual tooth on both gears and pinions polished, before I considered it good enough for exhibition.

The "glass" case was then attempted; the frame was made from $\frac{3}{8}$ -in. brass angle, cut to length, and silver-soldered over the domestic gas-ring. I rigged up a jig, for the soldering process, to hold the various pieces square, and, after many misgivings, was surprised to find it practically perfect.

By this time, the opening date for the 1946 MODEL ENGINEER Exhibition was drawing nigh, and I still had to make the wooden base. I had to search over half of London to find a piece of suitable oak moulding, which was finally procured, and, with modification, was mitred,



Details of tilting table and seconds indicator

stained and polished only a month before the opening date.

During that last month I had to work like the proverbial nigger; the whole clock taken to pieces, everything polished and lacquered, dials silvered, and "engraved" all screw-heads polished and tempered to a dark blue. Final assembly, with hours of patient adjustment, found the clock ready with three days to spare.

Like its predecessors, its time-keeping qualities are rather erratic, and no amount of adjustment will keep it consistent. One day it will keep time to within half a minute, and the next, it will be anything up to five minutes out, either way.

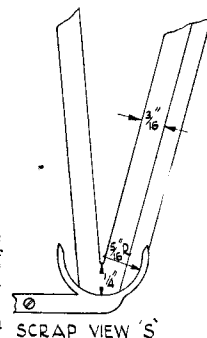
I still suspect that the fuzee is one of the main causes, because it is essential that the power of the mainspring must be evenly transmitted.

Anyhow, I have derived much enjoyment, solving the various problems which only a model engineer encounters. The whole job took 798 hours to complete, the last 98 being the most hectic.

Everything except the last fuzee was machined on a 3 1/2-in. treadle lathe at home, apart from the ball, mainspring, spirit-level and some of the B.A. screws, which were the only finished components bought.

The photographs were taken by a great friend of mine, who came up from Guildford for that purpose but, although usually a very successful photographer, he picked the wrong day, which was a very dark and gloomy one, and owing to the lack of natural and artificial light, he has lost definition in one corner.

My next attempt will be my own design of a French mystery movement.



A LIGHT-BOX

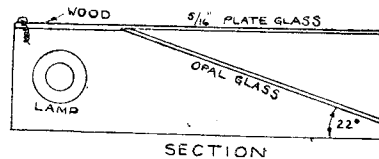
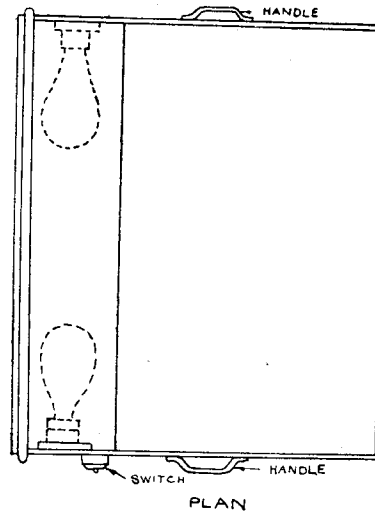
by R. S. Farmer

THE following is a description of a device which may prove useful to model engineers. Essentially, it consists of a box made of wood, which, in my particular case, is approximately 18 in. \times 16 in. and 5 $\frac{1}{2}$ in. in depth. The sides of the box are fitted with batten holders, as shown in the sketch, taking two low-wattage electric lamps. Four $\frac{1}{2}$ -in. holes are drilled near the front edge for ventilation purposes.

Resting on strips of wood, fitted down the inside of the sides, a sheet of opal glass is fixed at an angle of approximately 22 degrees; over the opal sheet, there is a sheet of $\frac{5}{16}$ -in. plate glass, fitted horizontally flush with the top of the box. The plate glass measures 11 in. \times 18 in., the opal sheet being, of course, the same length, but slightly wider to allow for the angle at which it is set. Along the front of the box, on the top of the two lamps, a strip of wood is fitted, flush with the plate glass and wide enough to cover the remainder of the box top. The box is fitted with the handles at the sides, a switch to operate the lamps, and a flex which leads out at the side of the box to connect to a suitable lampholder or plug. A metal bar, preferably of brass, and of $\frac{3}{8}$ -in. \times $\frac{1}{8}$ -in. section, is held in place along the front of the box by springs at the ends, fitted in such a way that it may be removed if desired.

The box was originally made for use as a surface-plate. It is extremely difficult to see the graduations on a rule held vertically on a surface-plate, also to set a surface-gauge accurately in a vertical plane; the speed with which this can be done on the surface-plate is quite astonishing.

The bar clamped along the front edge, holds down a sheet of white paper, which is most useful, and the depth of the box raises the bench level to a very convenient height for doing close work; it is ideal for watch repair jobs, and instrument work generally, the additional lighting from underneath being of great help. It can be used



for larger work, as the light, of course, need not be switched on.

The clamp bar along the front edge prevents small screws, etc., rolling on to the floor.

I obtained the opal glass quite cheaply and easily; but if it is unobtainable, ground glass could be used, or possibly plain glass with a thin white paper sheet covering it. Reflectors could be fitted to the lamps, but I have not found this necessary.

It is well to experiment a little to ascertain the exact angle which gives the best light over the top plate.

Two New Books

Messrs. Percival Marshall & Co. Ltd. are publishing this week two new books which are destined to fill a long-felt want in model engineering circles; they are: *Mechanics in Miniature*, by Percival Marshall, price 10s. 6d., and *Introducing Model Engineering*, by H. R. Hadlow, price 3s. 6d. At first glance, the two books appear to cover much the same field; but closer inspection reveals that they are complementary rather than competitive.

Mr. Marshall's book is a comprehensive review of model engineering during the past fifty years; in fact, its sub-title indicates that it describes "the romance of the fascinating and instructive hobby of model engineering and the activities of its many adherents at home and abroad," a description which could not be

bettered. A considerable amount of technical information is given in the text; the numerous illustrations, however, are excellent, in that they have obviously been most carefully chosen to provide as complete a pictorial record as possible of what has been achieved by model engineers in various ways and in many parts of the world.

Mr. Hadlow's book is a very good introduction to our hobby, and, in this respect, will appeal more especially to novices; but there is also much in it that will interest all model engineers. The contents, which are very well illustrated, consist mainly of constructive advice upon how to begin as a model engineer as well as what to make. The illustrations clearly show the variety and scope which is open to us all, and approaches the subject from the practical aspect.—J.N.M.

“HIELAN’ LASSIE”—TENDER

IT has taken rather longer than I anticipated to get out the sizes of a suitable tender for “Hielan’ Lassie” and make the drawing, seeing that I’m a wretched “calclationist,” and one of the world’s worst hands with the working tools of a mechanical draughtsman; but here we are, at last! The tender is of the

construction briefly, and note any differences where the detail work differs from that on the locomotive herself. With that and the dimensioned drawings, the construction of the tender, and the few trimmings needed to complete the whole job, should be what our air-pilot friends would call “a piece of cake.”

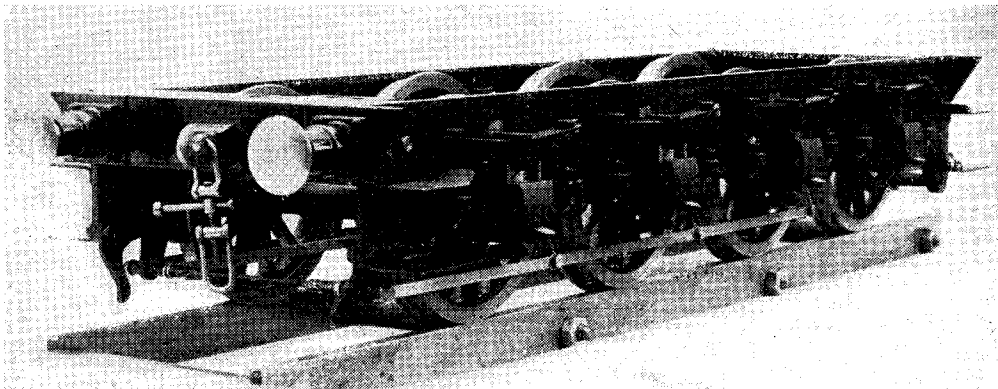


Photo by]

Mr. Pateman’s L.N.E.R. “Pacific” tender chassis

[C. J. Grose

latest type used by the L.N.E.R., with straight sides and a canted-in coal rail; it runs on eight wheels in ordinary axleboxes. The wheelbase being of moderate length, and all axles having a little side movement, the tender will take any curve that the engine will negotiate, although the fixed wheelbase is a little longer (12 in. against 10½ in.). I have therefore kept as near as possible to “scale” dimensions, and sincerely hope that Inspector Meticulous and all his friends and relations in this benighted world, will be satisfied. I’ve no grudge against the old boy—in fact, I heartily agree with many of his fads and fancies—but he’s certainly a bit trying sometimes!

Mr. Pateman, of the Sutton club, who made the ingenious “cantilever” portable track, is building a 5-in. gauge L.N.E.R. “A3” Pacific from the “full-size” drawings, and I recently had the pleasure of seeing some of the parts. He has completed the tender chassis; and as it is very similar to the “Lassie’s,” Mr. Grose has taken a photograph of it, which you will see reproduced here. A photograph is a great help to beginners and other inexperienced folk, who might be a little hazy as to what the finished article should look like.

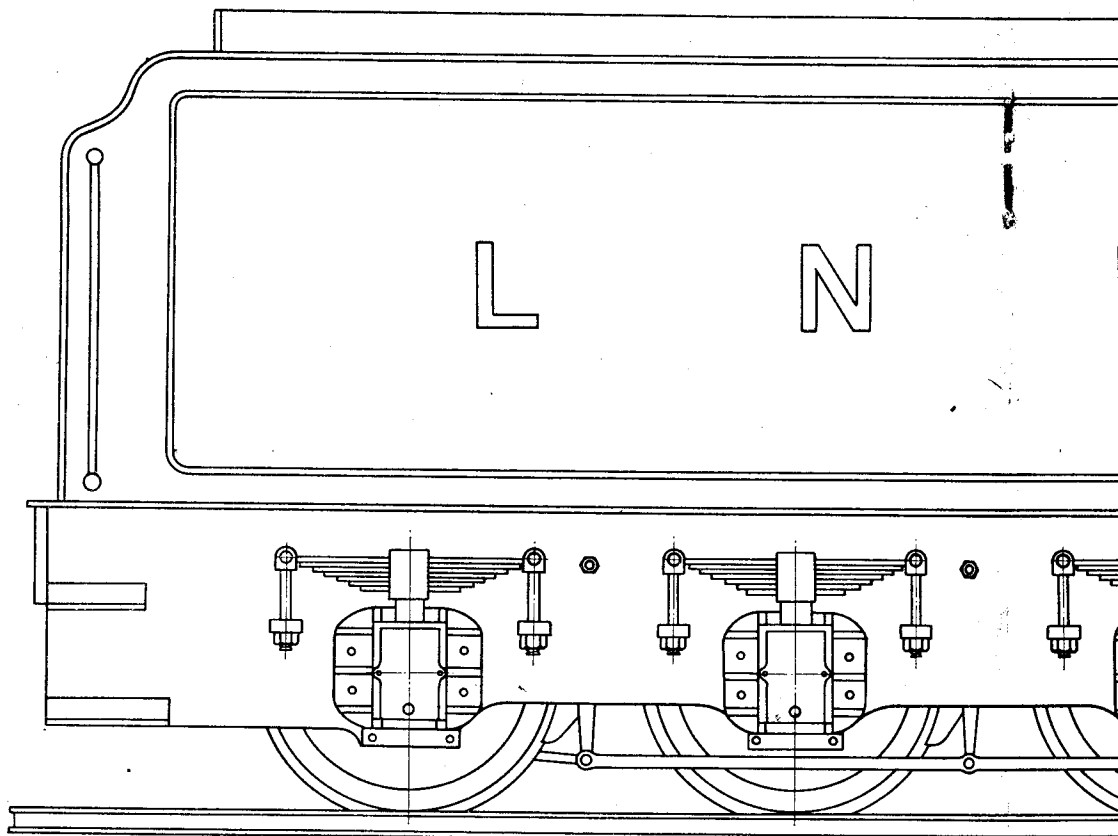
Well, after building the engine part of the “Lassie,” you won’t be needing a lot of detailed instructions to make the tender; even our beginner friends should feel quite experienced by now, so all I need do, is to run through the

Frames and Buffer Beams

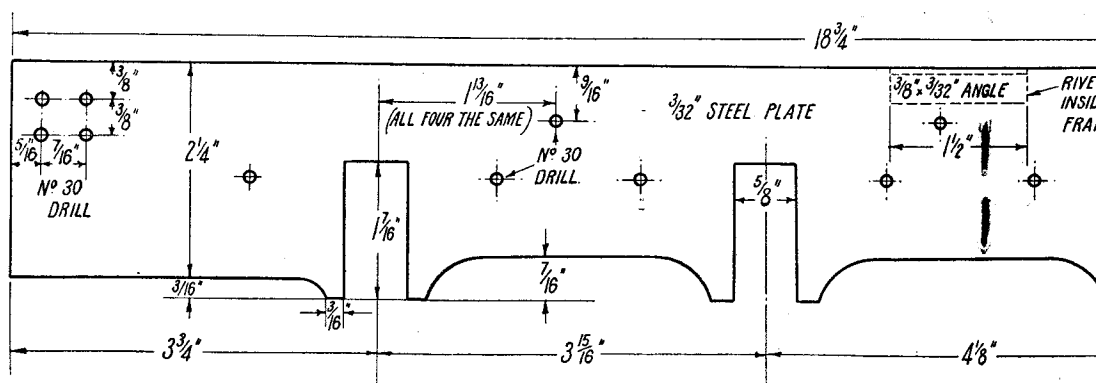
As there are no traction stresses to withstand, and the frame merely carries the weight of the tender and its contents, steel plate of 3/32 in. or 13-gauge, will be stout enough for the job. Either bright or blue will do; I rather prefer the latter, as it is usually soft and ductile, and doesn’t have any tendency to assume a bow shape when the openings for the axleboxes are cut out. Two pieces 19-in. long and 2½ in. wide will be needed. Mark one out to the given dimensions, as you did for the engine; drill a couple of the screwholes, temporarily rivet the plates together, and get busy with hacksaw, file and drill until your reward is a nice pair of frames. Mark which is the outside of each, before parting them, and be sure that all holes are in their right places.

The drag-beam and buffer-beam are made from 7-in. lengths of 1-in. by ½-in. angle; steel is best, either bright or black, but brass will do if nothing else is obtainable. Two or three of our advertisers informed me that they would be able to supply cast beams both for engines and tenders, with lugs for attaching frames; I have not seen any so far, but there may be some by the time these notes appear.

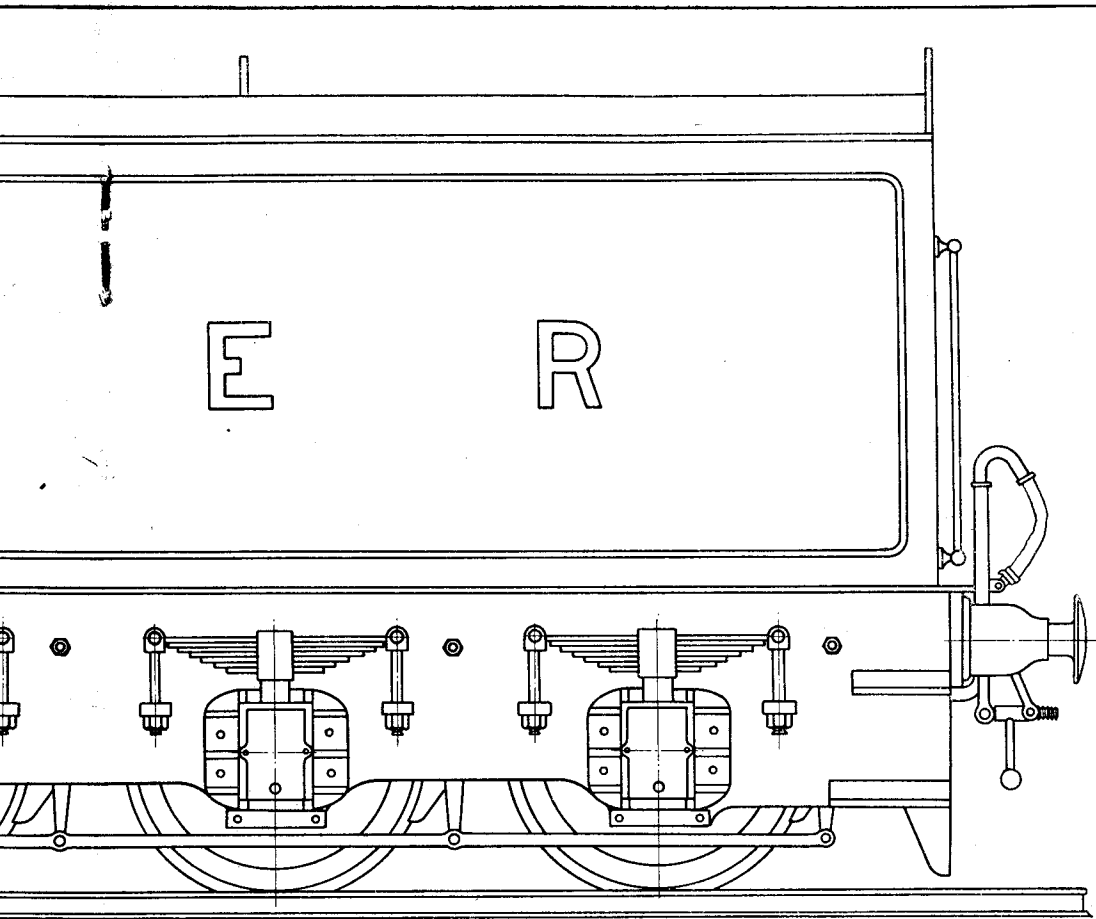
Anyways, the angle beams are finished off in the same way as those on the engine, working to the given dimensions; don’t make an error and cut the slots for the frames with the ½-in. cutter used for the engine—it’s easily done! As the later L.N.E.R. tenders have the ends of the buffer-



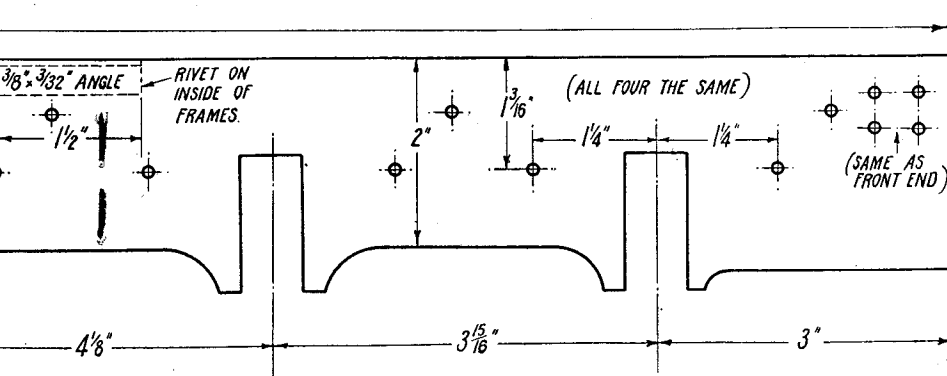
Tender for "Hielan' Lass"



Tender frames



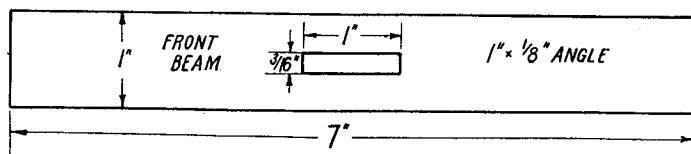
der for "Hielan' Lassie"



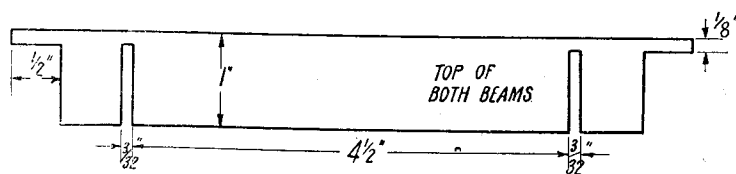
Tender frames

beam cut off at an angle, I have shown the small one finished the same way, but it can be left square if desired. I like the squared end best. Don't forget that the frames should be a very tight fit in the slots, and the latter must be dead at right-angles to the face of the beam, or one side of the tender will arrive at the terminal station before the other! Note, the holes for the buffer sockets are tapped instead of being drilled with plain holes; why, you'll see later.

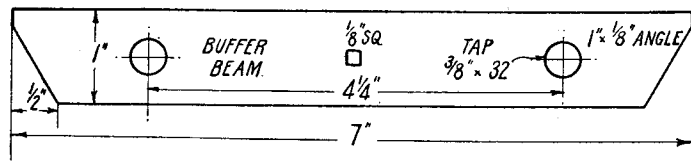
your humble servant doesn't. Simply drive the frames into the slots, and adjust for levels on your lathe bed as above. If the frames are *really* tight in the slots, no further preparation is needed for Sifbronzing or brazing; but if they aren't, put a distance piece (a true block of wood would do) between the frames, and a cramp over the lot. A toolmaker's cramp won't open sufficiently, but a carpenter's cramp would do very well. I often use one as a "safety first"



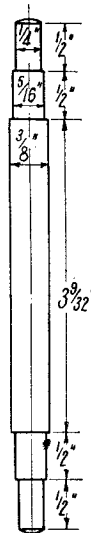
Tender drag beam



Location of frame slots



Tender buffer beam



Tender axle

Erection

There are two alternatives for erecting the tender frames; they can be attached to the beams by the usual bits of riveted and screwed angle, or the whole lot Sifbronzed or brazed up solid; it never needs to come apart any more. To fix by angles, four 3/8-in. lengths of the same kind used for the beams, are riveted to the beams flush with the inside of the slots for frames, as illustrated when describing the engine frame erection. Four 1/4-in. iron rivets in each, will hold the angles securely; countersink the holes on the outside of the beam, and file the rivets flush after hammering well down. A bit of 3/32-in. steel plate, jammed into the slot, will locate the angle exactly, which should be held to the guide by a toolmaker's cramp whilst the rivet holes are being drilled.

When all four angles are on, drive the ends of the frame into the slots, and lay the whole issue upside down on your lathe bed, adjusting so that both frames and beams lie truly on the bed, in contact with it for their whole length, and cannot be rocked. Then run the 30 drill in the holes in the frames, making countersinks on the angles; follow with No. 40, tap 1/8 in. or 5-B.A., and put screws in.

Anybody who has an oxy-acetylene blowpipe, needn't trouble about any angles and rivets;

measure, in case a frame or beam took it into mind to slip and spoil the whole doings. Then stand the assembly end-up in your brazing-pan; apply a little wet flux in the corner between beam and frame, play the flame of the blowpipe on it until bright red, then melt a little blob of Sifbronze into the corner. This will flow through, and make a perfect joint. Don't play the flame on it any more, once the metal has fairly run; you can overdo a good thing, and burn the joint.

The same procedure in setting up, is used for brazing; but the more diffused flame of a paraffin blowlamp or an air-gas blowpipe blown by bellows or fan, will take longer to heat the metal. Whereas with the oxy-acetylene jet, only the actual joint becomes red-hot, the whole of the beam and an inch or so of the frame plates, will have to be heated to get the joint hot enough to braze. Easy-running brazing strip can be used, or a pinch of granulated spelter; but for jobs of this kind I recommend a bit of ordinary soft brass wire. This melts at bright red, and will make a joint almost equal to a Sifbronzed one, both in strength and neatness. Silver-solder would do, at a pinch, but it wouldn't be so strong. Whether Sifbronzed or brazed, let the job cool to black, then quench out in clean cold water, and chip off any burnt flux sticking to the metal. Test again on the lathe bed, to see if anything

has shifted; and don't forget to wipe off the water before so doing, as water will do the lathe bed what the kiddies call "a bit of no good."

Three bits of brass angle, say $\frac{3}{8}$ in. by $\frac{3}{32}$ in. and about $1\frac{1}{2}$ -in. long, are riveted to the top edge of the inside of the frame plates, between the wheels. I have shown only one, in dotted lines, on the frame drawing. The exact position doesn't matter, as long as they are fairly central between the axles; they are only to take the fixing screws holding down the soleplate to the chassis.

Wheels and Axles

If you finish the frame erection before the next instalment comes out, carry on with the wheels and axles, as I haven't yet finished the drawing of the axleboxes and springs. Incidentally, you can use cast dummy springs with buffer plungers in the hoops, or real working leaf-springs, just as desired; I will give drawings of both, all being well, in the next spasm. Meanwhile the wheels are $2\frac{7}{8}$ -in. diameter on tread; this is smaller than the "scale" dimension which is $3\frac{1}{2}$ in. (4 ft. 2 in. in full size) for the simple reason that if we adopted the latter size, the flanges wouldn't clear the underside of the soleplate. Our flanges have to be deeper than "scale," otherwise the engine wouldn't stop on the road. The treads are cylindrical, or parallel, and not coned, for reasons stated previously in these notes; just chamfer the edge. Leave a nice radius at the root of the flange, to prevent grinding the railhead—this is important with a long fixed wheelbase—and round off the tip of each flange with a file. I've seen these left almost square, on professional "three-figure" jobs. The method of machining the wheel castings is exactly as described for the engine.

The axles are turned from $\frac{3}{8}$ -in. round mild-steel, the ordinary drawn variety being quite suitable; each end of the axle can be turned in the chuck at one setting, and the wheel seat and the journal must then of necessity be concentric and parallel. I have already described in detail, how to turn the wheel seats to a press fit in the reamed holes in the wheel bosses, so needn't go over it all again. Slightly round off the ends of the journals with a fine file; sharp edges will cut grooves in the axleboxes. All the wheels can be pressed on to the axles right away, as the axleboxes are outside. Well, I guess that is sufficient to keep all builders busy whilst I, too, get busy and finish some more detail drawings

"Large scale" old timers

May your humble servant add a hearty "hear-hear" to Mr. J. N. Maskelyne's suggestion that proprietors of the larger miniature railways run as a commercial proposition, should consider the merits of "modernised" locomotives of pre-1914 types; but why only "famous flyers"?

True enough, there is a wonderful fascination about a Stirling eight-footer, or a Johnson *Princess of Wales*, or a Great Western *Achilles* (not to mention Curly's beloved pets!); and to the modern generation who know only the huge Pacific, 4-6-0, or streamlined or "air-smoothed" atrocity, the appearance and

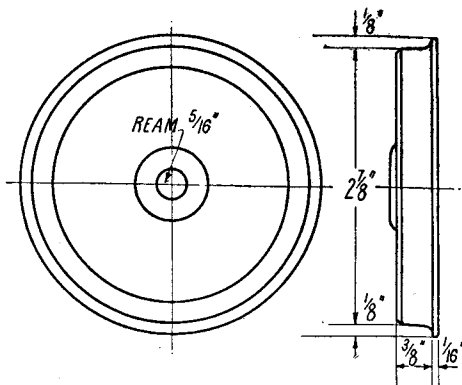
performance of such locomotives would certainly be a real eye-opener. Some folk seem to be under the impression that only size and ugliness can be associated with power and efficiency, but they never made a bigger mistake in their lives, as I have proved on both $2\frac{1}{2}$ -in. and $3\frac{1}{2}$ -in. gauges.

However, when it comes to handling real outside loads, what about setting some of the old-time "maids-of-all-work" to do the needful? If a 4 ft. 8 $\frac{1}{2}$ in. gauge Webb

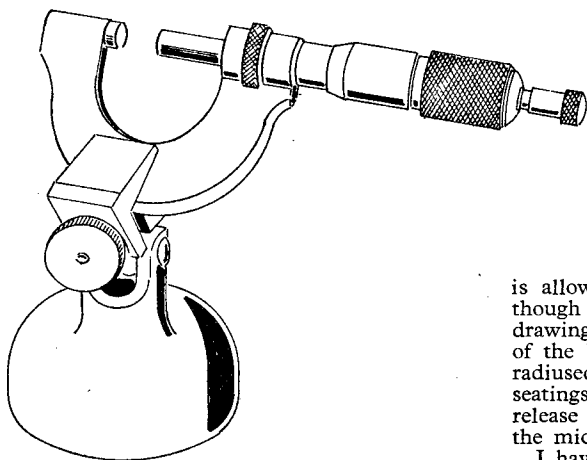
"Cauliflower" 0-6-0, or a Stroudley "Jumbo," or any "clink-bang" with similar wheel arrangement, could plod along with sixty wagons and a brake van, a small edition, especially if modernised with long-travel valves, superheating and mechanical lubrication, would do the needful in the way of hauling outside loads on miniature "commercial" lines, thus attending to the revenue-earning side of the business, as well as being an attraction from the historical point of view. The old-time goods and mixed-traffic engines never came into the limelight very much, yet the railway companies would have been properly sunk without them, especially at holiday times. I've known the old Brighton goods engines work day and night, daytime on passenger excursions (and very heavy ones at that) and at night on long goods trains, week in and week out; the only time the fire was out, was for a boiler wash-out once a week. They would come in, have all the steam blown out, be cooled down quickly by having a hosepipe stuck in one of the top plugholes whilst one just above the foundation ring was pulled out to let the water escape; a hasty wash-out, with maybe only half the plugs removed, then filled and lit up again, to resume business as soon as they had enough steam to turn the wheels. Nothing spectacular about *them*; but they did a job of work that deserves to be honoured and commemorated.

Another kind I would like to see in the "big little" sizes, are the ill-fated types that were either complete or comparative failures in full size, for either known or unknown reasons. For instance, there was the old Great Eastern "Mogul" designed by Massey Bromley; ostensibly a real hefty job, with 19-in. by 26-in. cylinders, 4 ft. 10 in. wheels, and ample firebox, yet the performances the class put up were so mediocre that they had a short life—and decidedly not a merry one! Now this design, with modern

(Continued on page 217)



Tender wheels



A STAND for the MICROMETER

by Ian Bradley

IT is sometimes more convenient to bring work to the micrometer than to take the micrometer to the work. This is especially so when frequent reference is necessary, such as when checking a number of similar pieces for size. Work of this nature can be done most expeditiously by providing a stand for the micrometer. At one time it was possible to purchase such stands, which consisted of a solid base with a tilting bracket having a clamp which held the micrometer in any desired position. A single nut locked both the bracket and the micrometer in place.

Originally, the price asked for these most useful pieces of equipment was the very modest sum of 12s. 6d., and at this figure it was scarcely worth while making them. But today, when they seem unobtainable, there may well be a number of readers who would care to make them up.

The work involved is by no means arduous, and is very well suited to those occasions when one "wants a job." Moreover, it is well worth while, for at the finish the constructor will be the possessor of a tool of undoubted utility.

Some little while ago I was fortunate in seeing an actual example of the micrometer holder, and the illustrations which are reproduced here are based on this.

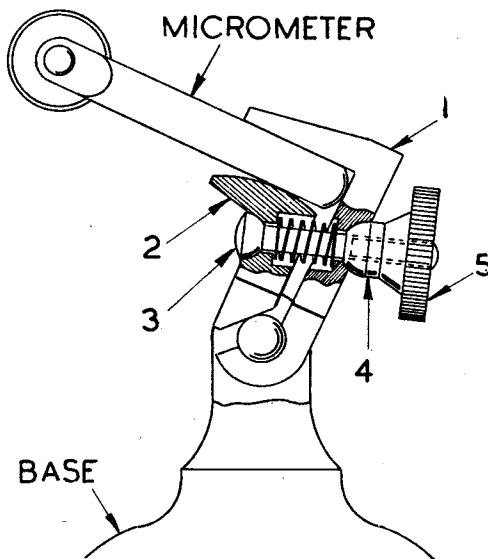
The secret of the whole device lies in the simultaneous locking of the bracket and micrometer, which has already been mentioned. The arrangement whereby this is effected will be clear from the part-sectional general arrangement drawing of the clamp. It will be seen that the jaw (2) makes simultaneous contact on both the pin in the stand and the frame of the micrometer, and that pressure exerted by the radiused head bolt (3) tends to intensify the clamping action of the jaw, which is forced upward by the wedging action of the pin. It will be further noted that the contact surface of the jaw is radiused. This increases the wedging action and also ensures that the frame of the micrometer makes even contact with jaw (1).

It will be clear that to enable the jaw (2) to automatically align itself, the bolt (3) must in no way bind in either of the jaws. To ensure that the bolt is quite free, considerable clearance

is allowed—actually a $\frac{5}{32}$ -in. hole is drilled, though this is not dimensioned on the detail drawings—and, in addition, both the underside of the bolt-head and the distance-piece (4) are radiused, as also, of course, are the corresponding seatings in the jaws. A spring is fitted to facilitate release of the jaws when it is desired to remove the micrometer from the stand.

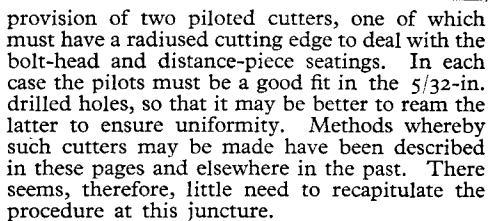
I have already said that construction is not a difficult matter, but there are one or two points in connection with the choice of material and machining which call for comment.

The base should be as heavy as practicable to ensure that the micrometer is on a rigid footing. A suitable material is brass or steel, preferably the latter. The $\frac{1}{4}$ in. pin fitted should be a light driving fit and is best made a very slow taper so that it can be pushed in by hand until it is just registering in both ears of the stand. From this point it may be driven home, using a brass drift. It is as well to mark the "In" and "Out" directions of the pin, as it may be necessary to remove it if it is thought desirable to fit a pen steel spring washer as was done on the original example.



The purpose of this washer is to keep the bottom ends of the jaws in contact with the pin by exerting a sideways pressure on the assembly, thus holding the jaws together frictionally against one ear of the stand.

After both jaws have been drilled they must be counterbored sufficiently to take the spring and radius-faced bolt-head and distance-piece. No attempt has been made to dimension the various counterbores, as this would inevitably confuse the drawings. But if the work is carried roughly as shown in the general arrangement drawing, this will be quite satisfactory. It will entail the



(Continued from page 215)

specifically mentioned the presence of L.N.E.R. type engines on the Romney, Hythe and Dymchurch Railway. Well, wouldn't it be a real treat, a glad sight for tired eyes, to see the Romney-Hythe express headed by one of old Jimmy Stirling's "F" class 4-4-0's with the safety valves in the middle of the boiler barrel, round-topped cab, winged smokebox, whistle on top of a long pipe, and all the old familiar blobs and gadgets, and painted in the old colours? If *that* wouldn't be the right sort of historical outfit for that part of the globe, neither would a pageant of Conqueror Bill landing at Hastings. What about it, Messrs. Holder and Howey?

★ JET PROPULSION

Part II — by "ARTY"

THERE are two methods of ground testing jet units which will be described herein :

- (a) Rotating Arm.
 - (b) Trolley
- By "jet units," the following are implied :
- (a) Turbo-Compressors.

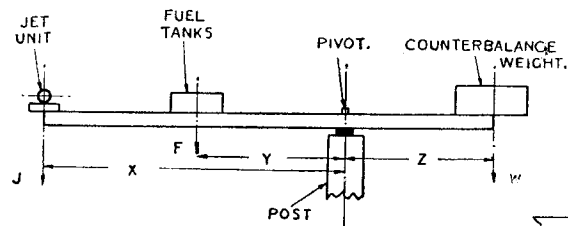


Fig. 1

- (b) Compound units.
- (c) Athodyds.
- (d) V-1 type ducts.
- (e) Rockets, solid or liquid fuel.

When testing these units, the following readings generally will be required :

- (a) Thrust.
- (b) Fuel Consumption.
- (c) Air Velocity.
- (d) R.P.M. (Rotary compressors and/or turbines only).
- (e) Various Pressures.
- (f) Temperatures.

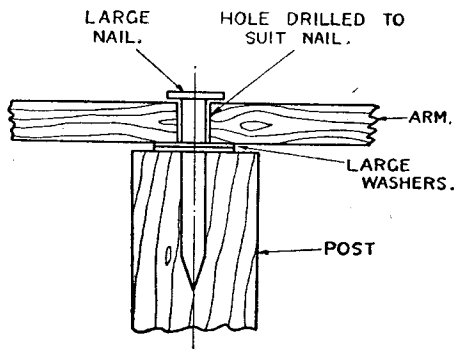


Fig. 3

The technique of testing the various units will vary in detail but the broad principles will apply. The two main methods will be described first and then the instrumentation discussed.

Rotating Arm

An arm is mounted on the top of a post so that it can rotate freely. The jet unit to be tested is mounted at one end of the arm while the other is counterbalanced (see Fig. 1). Fuel tanks and auxiliary equipment will also have to be mounted on the arm. If J, F and W lb. are the weights of the jet unit, fuel tank and counter-balance weight and X, Y and Z ft., their distances from the pivot and the weight of the arm is P lb. per ft., then, taking moments about the pivot :

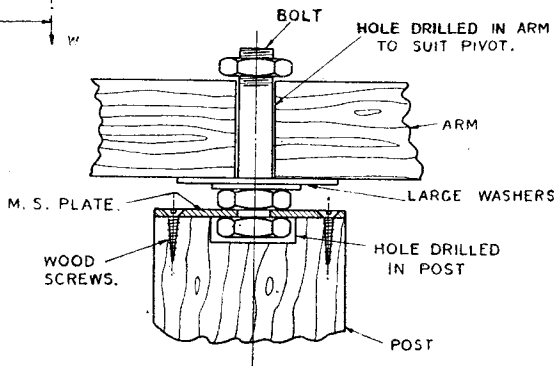


Fig. 2

$$JX + FY + \frac{PX^2}{2} = WZ + \frac{PZ^2}{2}$$

$$\text{Hence } W = \frac{1}{Z} \left\{ JX + FY + \frac{P}{2} (X^2 - Z^2) \right\}$$

giving the counter-balance weight required. It is preferable to counter-balance the arm rather than rely on the rigidity of the pivot to maintain the arm horizontal. Fig. 2 shows a suggested arrangement for this pivot while Fig. 3 is a simpler method. The post, of course, should be perfectly rigid and if necessary, guy ropes or wires can be used like a tent.

This method of testing is not satisfactory as it is difficult to measure the thrust, velocity of the unit, the r.p.m. of any rotating members or any pressures. Its advantage lies in its simplicity and ease of construction. Also, one can well imagine it being used by the eager enthusiast who has just built his first jet engine and who must try it immediately. In so far as it enables one to determine whether the unit functions or not, it is useful, but for serious research it is totally inadequate.

*Continued from page 191, "M.E.," August 14, 1947.

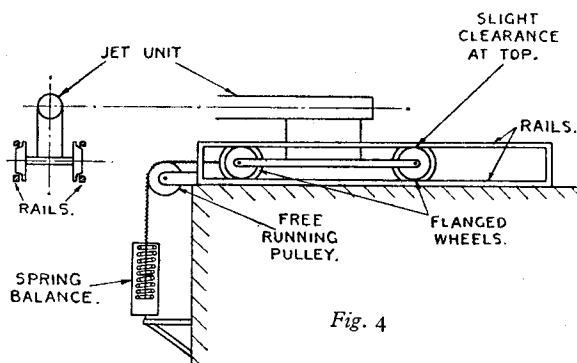


Fig. 4

Trolley

Under this heading are included test rigs where the jet unit does not move appreciably and then only in the line of thrust. Desirable features may be tabulated as follow:

TWO MARKS SUCH THAT THE DIFFERENCE IN LEVEL REPRESENTS A KNOWN CONVENIENT AMOUNT OF FUEL.

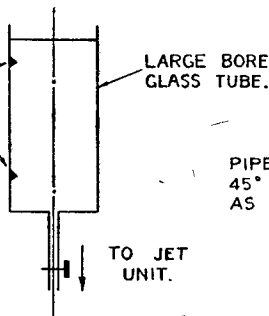


Fig. 5

- (a) Unit fixed rigidly except in the line of thrust.
- (b) Unit can move freely along the line of thrust until balanced by a thrust-measuring device (e.g. spring balance). This movement should not be great, however.
- (c) Movement of the unit to be unrestrained by fuel pipes, pressure lines, etc.

One method of satisfying these conditions is as shown in Fig. 4. Here the jet unit is mounted on a trolley running on rails with a check rail

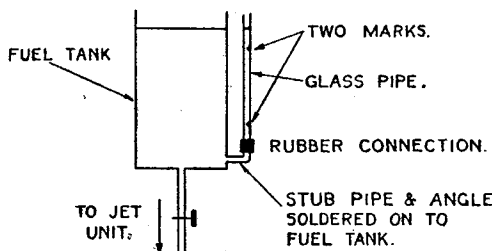


Fig. 6

from the trolley passes over a free-running pulley to the spring balance. The cord must be exactly horizontal from the trolley to the wheel (the jet unit thrust line and rails also being horizontal, of course) and vertical from the wheel to the spring balance (assuming a vertical spring balance).

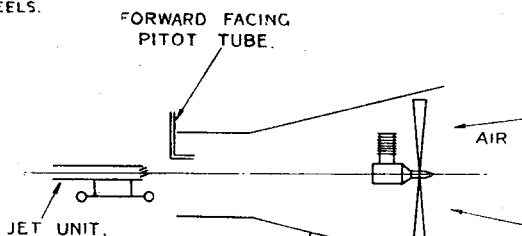


Fig. 7

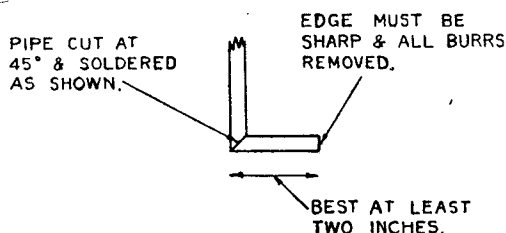


Fig. 8

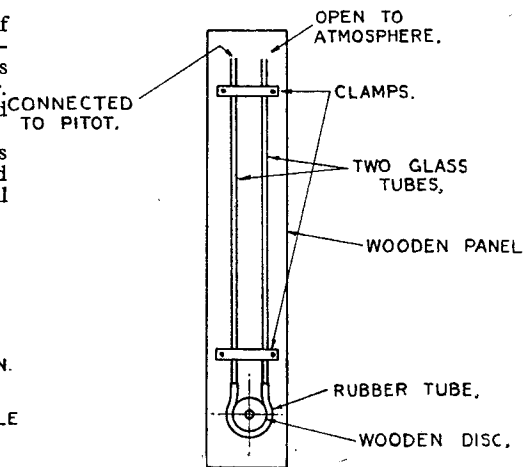


Fig. 9

above to stop the trolley lifting. As the unit begins to function and the thrust builds up, the trolley moves backward and the spring balance provides the thrust reading directly. The cord

Fuel tanks and other auxiliary apparatus should be mounted so as not to affect the free movement of the trolley. For instance, the fuel tank can be mounted on the trolley itself, or

placed elsewhere and the fuel led to the jet unit via a flexible pipe.

Instrumentation

This covers methods of measuring various quantities and is applicable largely to the trolley method. The thrust has already been dealt with. The rate of fuel consumption can best be determined by timing the consumption of a

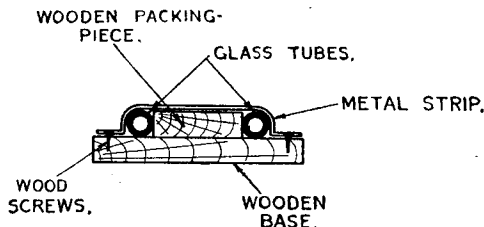


Fig. 10

known amount of fuel. If the glass-ware situation is good, a device similar to Fig. 5 can be used. The method is to run the jet unit and to note the time taken for the level of the fuel to fall from one mark to the next. If suitable glass-ware is not available, a tin will have to suffice with a glass stand-pipe attached, with the two marks on that (see Fig. 6).

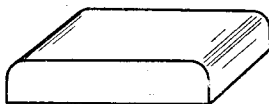


Fig. 12. Wooden former

It may be necessary or desirable to simulate flight conditions and have a steady flow of air over the jet unit. This is probably best provided by a petrol engine and propeller, if necessary, ducted to the jet unit as shown in Fig. 7. The velocity of this air flow may be obtained by a forward facing pitot tube (Fig. 8). The pressure can be measured by a water manometer or U-tube (Fig. 9). Figs 10 and 11 show cross-sections of the clamps and bottom wooden disc. The metal strips used for clamps are easily made on a wooden former such as Fig. 12. The difference in levels of the liquid in the two arms of the manometer can be measured by slipping a long narrow piece of one inch squared graph paper behind the glass tubes. The water can be coloured by the addition of a small amount of potassium permanganate. If H is the head of the water shown, that is, the difference in level of the water in the two arms, then the air velocity, V , is given by:

$$H = 2.288 \left(\frac{V}{100} \right)^2$$

where H = Head, inches of water
and V = Air velocity, ft. per sec.

This manometer may also be used for measuring any other pressures that may be desired, e.g. pressures along the duct of a V-I type unit, fuel pressure, etc.

The r.p.m. of a compressor and/or turbine is rather difficult to obtain, remembering that any device used must not restrict the movement of the compressor or turbine. As the torque will not be great and the r.p.m. is likely to be high, direct contact methods are almost entirely ruled out. The ideal method is to use some form of stroboscope, but this is unfortunately a somewhat rare piece of apparatus. A possible method

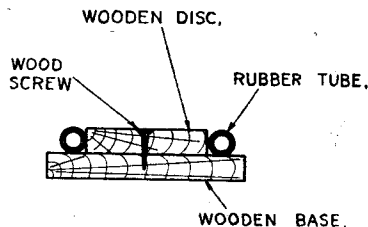


Fig. 11

would be to attach a light springy strip of metal to the shaft (see Fig. 13); this should be let in to the shaft by a central slot so as to minimise out-of-balance forces. As the shaft revolves, the turned over tip will cause the strip to deflect outwards as shown in Fig. 14, and the diameter "A" will be a measure of the r.p.m. This

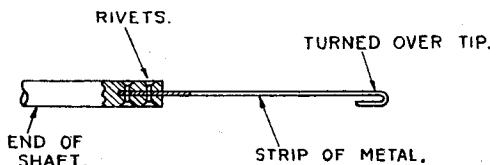


Fig. 13

suggestion would, of course, need some development to determine the best dimensions and material for the strip for a given speed range. The device would be amenable to calculation, but it would probably be best to calibrate experimentally, that is, determine the diameter "A" for various known r.p.m. Any surging of the r.p.m. would render readings by this method almost impossible and again it must be pointed out that the stroboscope is the ideal instrument for this work.

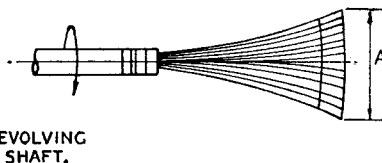


Fig. 14

In conclusion, I would like to say that I hope these notes are of some slight use and lead to more scientific study of these intriguing power plant possibilities. I have not discussed the question of temperature measurement, as I hope to contribute a brief article on that subject shortly.

THE "E.D." COMPRESSION-IGNITION ENGINE

THE rapid expansion in the popularity of the small compression-ignition, or so-called "diesel" engine, and its production by so many manufacturers, both in this and other countries, has given rise to a situation which is somewhat bewildering from the point of view of the prospective buyer, and it is necessary for us to adopt a policy of caution in describing or reviewing such engines. So many of the new engines introduced are produced by firms new to the model engineering trade, and in many cases the quality of an engine can only be assessed by very careful investigation and test; it is quite impossible to form an opinion of its quality from superficial inspection or consideration of design, and still more impossible to rely on the evidence afforded by the illustrations or publicity matter issued by manufacturers. The success of any engine, however attractive in design or appearance, depends almost entirely on accuracy of construction and the correct use of materials, neither of which factors are normally apparent to the eye.

It is therefore clear that in taking the responsibility of recommending these engines to our readers, it behoves us to be extremely careful in making sure that they are capable of living up to the claims made for them. We do not wish to make odious comparisons between different makes of engines, though it is well known that their merits differ very widely; and it is obviously impracticable for us to warn readers regarding products which are dubious or definitely below par. The only sound policy, therefore, in reviewing these engines—and this applies also to a good many other products whose qualities lie below the surface—is to mention only those which have actually been subjected to a minute examination and running test at our hands.

Readers may, therefore, be assured that if an engine is mentioned in THE MODEL ENGINEER Editorial columns, it is a proof that the sample tested, at any rate, is sound; and though this does not prove that all the productions of the same firm are equally good, it does at least

indicate competence in this respect. Our silence regarding any particular product, on the other hand, does not necessarily indicate our disapproval.

We have recently examined and tested a sample of the "E.D." compression-ignition engine

(Mark II), manufactured by Electronic Developments (Surrey) Ltd., 18, Villiers Road, Kingston-on-Thames Surrey.

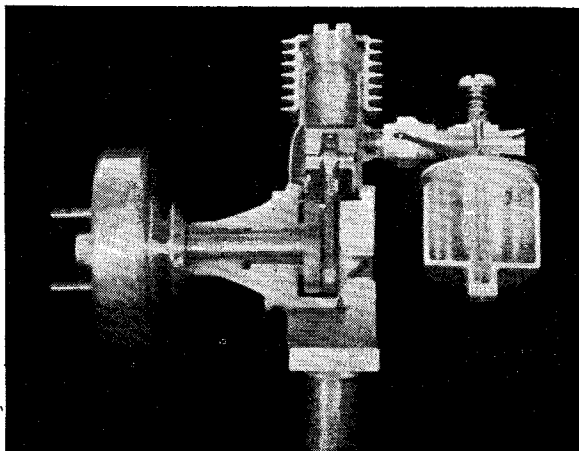
This engine is of clean external design, and sturdy in construction, having a bore of $\frac{1}{2}$ in. and a stroke of $\frac{5}{8}$ in. (approx. 2 c.c.), and weighing, complete with 10 in. wooden air-screw, approximately 6 oz. In common with most small engines in this class, it is of the "flat-top" two-stroke type, having two

diametrically-opposed exhaust ports, with stub exhaust pipes permanently attached to the cylinder and a single transfer port at right-angles to the exhaust ports. The usual contra-piston is fitted for compression ratio adjustment, but is operated in a rather unusual way, by screwing down the entire finned portion of the cylinder jacket.

The crankshaft of the engine is hardened and ground and runs in cast-iron bushes, inserted from either end of the bearing housing, which is integral with the front crankcase endplate. At the front end, the shaft is reduced in size and screwed to retain the hub, which is positively driven by a square on the shaft. The cylinder is of steel, machined all over, hardened and honed, and secured to the crankcase by a base flange with four screws. Both the piston and contra-piston are of steel, precision ground; the connecting-rod is also of steel, machined from the solid. For use in other than aircraft models a flywheel weighing approximately $4\frac{1}{2}$ oz. and having a vee starting pulley incorporated, is supplied.

On test, the "E.D." engine proved to be an easy and consistent starter, and develops high power and speed for its size, though no actual measurement of either was made. The compression is very good, both when the engine is hot or cold, and showed no signs of falling off

(Continued on next page)



THE LEA-TAYLOR TOOL HOLDER

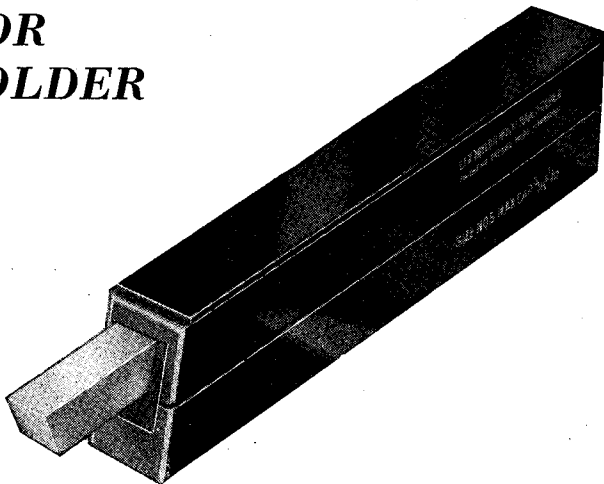
A GREAT deal of ingenuity has been exercised in the past in the design of lathe tool holders for using small cutter bits, but comparatively few of the many types introduced have stood the test of practical usage, being in many cases too complicated, flimsy or limited in application. The latter deficiency, to the class of lathe user with whom we are mainly concerned, is perhaps the most serious of all, because versatility and adaptability are of paramount importance when a wide variety of turning work is dealt with, as in model and experimental engineering.

Practically all the lathe tool holders hitherto encountered have been designed to take one particular standard size of cutter bit, a feature which has the advantage of keeping down the range of sizes of tool steel which must be kept in stock, but is definitely uneconomical when widely different widths of tools are required, and makes it impossible to utilise properly any tool steel which is not of the specified size.

The Lea-Taylor tool holder is, we believe, unique in being designed to take no less than five different sizes of tool bits in a single holder. In the No. 4 size holder, which is suitable for use in most of the lathes used by model engineers, having overall dimensions of $3\frac{1}{2}$ in. long by $\frac{1}{2}$ in. wide by $\frac{13}{16}$ in. high, the maximum size of tool bit accommodated is $\frac{3}{8}$ in. square, and provision is also made for bits $\frac{5}{16}$ in. sq., $\frac{1}{4}$ in. sq., $\frac{1}{8}$ in. by $\frac{3}{16}$ in. and $\frac{1}{4}$ in. by $\frac{1}{8}$ in., the last mentioned being suitable for a parting or screwcutting tool.

The shank of the holder is divided laterally along its horizontal centre line, the two halves being dowed together, and spring-loaded so that they tend to spring apart to a limited extent, but cannot normally be completely separated. Grooves are cut in each half for a portion of the length, of such a size as to admit the largest section of tool bit specified, so that when the shank is clamped in the lathe tool post and the halves are thereby pressed together, the tool bit is firmly held.

To accommodate the smaller size bits, angle section packing-pieces are supplied, which take



up the surplus space in the slot of the shank. These may be placed either way up or either end foremost, so that the bit is disposed either higher or lower, or to right or left as required. It will readily be appreciated that when only a narrow point tool is required, it is much more economical, and involves less tool grinding, to use a narrow section of tool steel than to use the full square section; and the convenience of being able to dispose the point either to right or left will also be obvious. As the slot is not cut truly horizontal, but has an inclination of about 5 degrees from front to back, a slight top rake is provided on the tool bit, and by moving the latter inwards or outwards, fine adjustment of the height of the cutting edge may be obtained.

The tool bits supplied with the holder are of 10 per cent. Cobalt, high-speed steel, but obviously any standard tool bits may be used, and the range of sizes which can be accommodated may be further extended by making angular packing pieces to suit; even round cutter bits not being excluded. In addition to the straight tool bits, forged tool bits having various shapes and offsets can be supplied. The complete set consisting of the holder and five tool bits with appropriate packings, is supplied in a neatly finished hardwood case, with double clasp fasteners. These tool holders are manufactured by Messrs. Taylor and Jones, Ltd., Honley, near Huddersfield, and marketed by Messrs. T. Garner & Son, Ltd., 5, Sheffield Road, Barnsley, Yorkshire.

The "E.D." Engine

(Continued from previous page)

during the duration of the test. Compression control is a little on the stiff side and is open to some criticism in calling for the use of some form of tool to operate in the cross-slide of the head; but when once set for the particular fuel in use, it appears to need little or no alteration afterwards either for starting or running.

We have seen these engines in production and can affirm that the equipment, management and

quality control of the factory are up-to-date and efficient. Our carefully considered opinion is that the general quality of the engine is certainly equal to that of most engines produced either in this country or abroad; that it appears to be capable of a long useful life, and at the price offered—lower than most of the engines in this class—it represents excellent value for money.

Editor's Correspondence

Brentwood Track's Day Out

DEAR SIR,—It came as a great surprise to see in "Smoke Rings" of July 10th, Major Lawson's glowing account of "Simpson's Day" and his kind references to our past gatherings.

I should like to thank Major Lawson for reporting what we did on Whit Saturday, and you, sir, for printing it in our paper.

On Whit Monday at the Brentwood Hospital

The "Ideal Lathe" Competition

DEAR SIR,—The organisation of this escaped me and I do not know the terms of the Competition. However, in answer to your appeal here are a few observations.

Entry No. 1. Mr. K. N. Harris

This is a good clean design, simplicity being a keynote. The machine has a good capacity for its size and the range of accessories is a very good



Fete the model railway was the centre of attraction and just "stole the show."

We were snowed under with would-be passengers and at times had difficulty in controlling the crowd. Thanks to those who so kindly assisted, we raised £40 for the hospital and have been asked to repeat the show next year.

As you are aware, the Brentwood track was designed to lay out on a flat floor, and so we could not just put it down on a grass field.

A friendly builder kindly lent me some 80 concrete blocks shown in the photograph, and the track was laid on single bricks on these. Thus supported at 3 ft. intervals the track stood up to the heavy loads without the slightest trouble—which appears to show that the design is sound.

For those who have not seen the track I may say it has six rails, eleven gauges, a guard-rail next the inner one and is banked to make it safer at high speeds.

Yours faithfully,
S. W. SIMPSON.

Brentwood.

point. I consider it unfortunate that rack-and-pinion traverse has not been included in the design, not even as a possible extra. Setting the front shear of the bed forward a little and providing a machined face would enable rack-and-pinion and alternative apron to be fitted. The 20T. and 60T. gears to the leadscrew could be made quickly interchangeable and with the handle applied to the lower position the leadscrew could be made normal R.H. thread and normal rotative direction be retained.

Separate guide-ways for saddle and tailstock is a good point; but care must be taken to ensure adequate purchase for the tailstock. Setting the centre-line of the lathe back half-an-inch would help here. Arranging a ram clamp without slotting the casting and placing it at the rear and bringing the clamping bolt more to the left are two minor modifications; but the whole design of the tailstock with regard to its general profile is in need of modernising. It would not be impossible to arrange for a much more pleasing shape.

It should be possible to arrange for the adjustable gibs (proper gibs, I am pleased to note) of both cross-slide and top-slide to be placed on the side generally away from pressure of cut. Size of boring table is a good point, but whereas it is easy to appreciate the offset of the top-slide feedscrew, I do not see why the feedscrew for the cross-slide should not be placed centrally.

Four holding down bolts are ample.

Headstock arrangements appear to be quite good, and being able to change gear in one lever movement is a decided advantage.

Drilled and tapped holes should be provided in order that a modern type of self-contained countershaft and motor platform can be bolted to the lathe bed at the rear of the headstock.

Accessories. Item 3. Simple dividing device more or less needs to be supplied with the machine at the beginning. Item 4. Milling and drilling spindle to suit boring table and vertical slide, and supplied with standard packing piece is a good item.

Item 1 and Item 9. Collet adaptors both very good items. Item 9 could take standard push-in collets, several types of which are already manufactured.

Entry No. 2. Mr. D. R. Geater

This design carries some excellent features but would be more expensive than No. 1. The machine would appear to be heavier and incorporates a number of refinements. Headstock arrangements are good, but the 4-speed vee-belt pulley could be standardised together with a bolt-on countershaft as mentioned before. The back-gear is a well-tryed design and makes for clean exterior to the lathe. It would seem that the tailstock of this machine also could be modernised in appearance. Lever clamps would be a great improvement. The tenon should be adjustable, i.e., folding wedges principle. A good bold leadscrew is fitted, but I prefer double thrust bearings located at the headstock end. Having the rack in two identical pieces is a neat idea, but they would really have to be interchangeable. Rack-and-pinion traverse with reverse pinion to give normal rotative movement and correct pattern split nut box are both good features.

The slide-rest follows the older pattern and, whilst keeping the saddle swing at a maximum, suffers from two disadvantages. The screw being uncovered quickly becomes covered with swarf (especially brass) and having a rear bearing (presumably with thrust nuts on the outside) quick removal of the cross-slide is impossible. An unsupported rear end to the feedscrew enables the cross-slide to be quickly removed and a boring table to be substituted. Gib strips are fitted and appear to be held by square-headed set screws. Allen grub-screws and hexagon lock-nuts are most satisfactory for this purpose.

The lathe is fitted with a reverse gear-box. This is enclosed and built as a separate unit, which makes for ideal lubrication conditions.

The machine is shown fitted on floor standards of box construction. Care should be taken that the lathe bed is not used as a bridge here. The underframing should be self-contained. No mention is made of accessories or provision for fitting them subsequently.

Entry No. 3. Mr. G. A. Williams

This is an unusual design, being predominantly a motor and gear-box. The gear-box would appear to have been carefully thought out and with two exceptions provides incremental speeds at the mandrel, thirteen in number and ranging from a low of 13 r.p.m. to a high of 1,068 r.p.m. Gear-driven lathes possess some advantages, but I doubt if any of them benefit the small user or the small lathe. Gears have to be removed and replaced each time a speed change is desired. This is nearly always a dirty and messy proceeding. The machine would be noisy.

The control switch is placed handy, but in line with most of the drips of cutting oil.

The saddle and apron form a one-piece casting which carries a slotted boring table. No micrometer index is shown and no top-slide is fitted. The longitudinal traverse is obtained by rolling a worm-wheel on the leadscrew. This gives contra-wise movement to normal and tends to deflect the leadscrew. A simple half-nut is shown with a lift-up action. This also tends to deflect the leadscrew. The tailstock is triangulated with a wide base and has no set-over. No mention is made of any accessories. I do not see how it is possible to assemble the saddle on the lathe bed, in view of the fact that the saddle cannot be lowered on to the bed but must slide on from the right-hand end, which it cannot apparently do. But this is a small matter which can easily be rectified.

Summing up I should be inclined to say that this design, No. 3, has had all the attention given to the all-g geared idea, and the rest of the machine is not up to the same standard. It has particular applications but suffers from too many weak points.

Design No. 2 offers good rugged material in well-tryed and trusty form but is open to a few amendments. I notice that the thrust race on the mandrel appears to take the thrust from the speed cone instead of from a shoulder on the mandrel, thus giving rise to much friction when running in back gear. But this is easily modified. A modified tailstock and slide-rest and provision of boring table would bring this machine to the forefront but it must be admitted that many people do not like integral headstocks and leadscrew bearings. If right, they are undoubtedly very good, but if not right they cannot be easily corrected.

Design No. 1 offers the best combination of sound design and bright ideas; but, here again I would like to see a number of modifications. There is no reason why a good lathe should not be a good looking as well, and I am afraid that American manufacturers can be shown to pay more attention to this very important point. The great thing about this design is that it is recognised that the lathe is a portion of an equipment. While the rest of the equipment is not shown, doubtless it will all be in keeping with the lathe itself. And this is really an important point. The design also is one which lends itself to production at a satisfactory figure.

No mention is made of limits or tolerances. Unfortunately, so few makers of small popular lathes give any guarantee of accuracy. A notable exception, of course, was the late Henry Milnes who guaranteed his machines to within a thou.

With modern methods and good production plant, it should be possible to do this with a popular design of lathe. Good machinery means time and cost saved on fitting. This is a most important part of the making of a lathe. So often in the past, in popular priced machines, this has been scamped and quite frequently not even

attempted, the parts just having been "put" together. My opinion of the designs in order of merit is the same in which they are published 1, 2 and 3.

Yours faithfully,

Wembley.

WM. A. SANDER.

Club Announcements

Whitefield and District Model and Engineering Society

On Saturday, September 6th, we are holding an open competitive track event, to which all clubs in the area are cordially invited to attend and bring along as many locomotives as possible.

Trials of speed, weight-hauling, and tug-o'-war are to be held, and prizes will be offered, subject to sufficient entries being received.

Tea will be provided at a small charge, and a film show will be held in the school in the evening.

Secretary: A. STEVENSON, 2, Newlands Drive, Prestwich.

Fareham and District Model and Experimental Society

The above Club is progressing very favourably and we hope to be able to increase the membership considerably during the winter months; already we have had many happy and instructive meetings.

Facilities for running boats are available in Fareham Creek, and indoor model flying and car racing meetings are held in the Melgrade Hall, West Street, Fareham.

Hon. Sec.: A. MAY, "Fairway," Bath Lane, Fareham.

Scunthorpe Society of Model Engineers

A ship modelling section of the above Society was formed at a recent meeting. A selection of the necessary drawings for the construction of various types, including sailing craft, has been made available to the section. Added interest in this branch of model work has been given by the recent announcement that a lake, which may be used for sailing purposes, is to be provided in the layout of the Central Park. Such facilities having been sought by the Society, it is intended to have an interesting fleet ready for sailing by the time this water is available.

Billericay Society of Modelmakers

The Billericay Society of Modelmakers was officially constituted on July 31st, 1946. The first public function was at the Chelmsford Society's show, when a very good representative exhibit was put up by the Billericay Society, and two of our members, Mr. Richman and Mr. Sutton, were invited to act as judges.

October 29th-31st saw our first real effort, in partnership with Mr. Sutton's Youth Organisation at the Senior School, Billericay. This resulted in increased membership.

A suggestion for a pond and racing track for tethered models was put forward and an approach to the local Council was made, resulting in qualified permission to use the water in Lake Meadows. Steps have been taken to affiliate to the Model Power Boat Association.

The Society's 1947 Exhibition will be held in the Hall of the Women's Institute on September 18th-20th, and previews of models under construction from time to time hold out hopes of a very successful show.

On Whit-Monday, at Brentwood, we were asked to lend a hand at a Fete arranged in aid of the local hospital. The two tables which we filled and attended to were the centre of interest throughout the day, and a total of more than £20 was raised in the Model Tent alone. Modesty forbids the publication of some of the comments made there.

A challenge having been received from the Youth Organisation and Sea Cadets, sailing yachts are now under construction for the purpose of upholding the prestige of the Society, and it is hoped to arrange a regatta at a later date.

Hon. Sec.: FRANK H. W. COX, Woodside, Perry Street, Billericay, Essex.

Macclesfield and District Society of Model and Experimental Engineers

The next meeting will be held on Monday, August 25th, at the workroom. Agenda: Communal Model Road Roller and future programme.

Any new members or lone hands please contact the Hon. Secretary, W. H. HOUGH, 76, Bridge Street, Macclesfield, Cheshire.

Correction

In our classified columns of August 7th issue the advertisement "Seal 15-c.c. Four-Cylinder Engine Castings" which appeared under the heading "Models and Fittings" applies to Craftsmanship Models Ltd., Norfolk Road Works, Ipswich, not Davies-Charlton & Co., Rainhill Road, Barnoldswick, via Colne, Lancs.

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The Editor invites correspondence and original contributions on all small power engineering and electrical subjects, which should be addressed to him at 23, Great Queen Street, London, W.C.2. Matter intended for publication should be clearly written, and should invariably bear the sender's name and address.

Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All correspondence relating to sales of the paper and books to be addressed to THE SALES MANAGER, Percival Marshall and Co. Ltd., 23, Great Queen Street, London, W.C.2.

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